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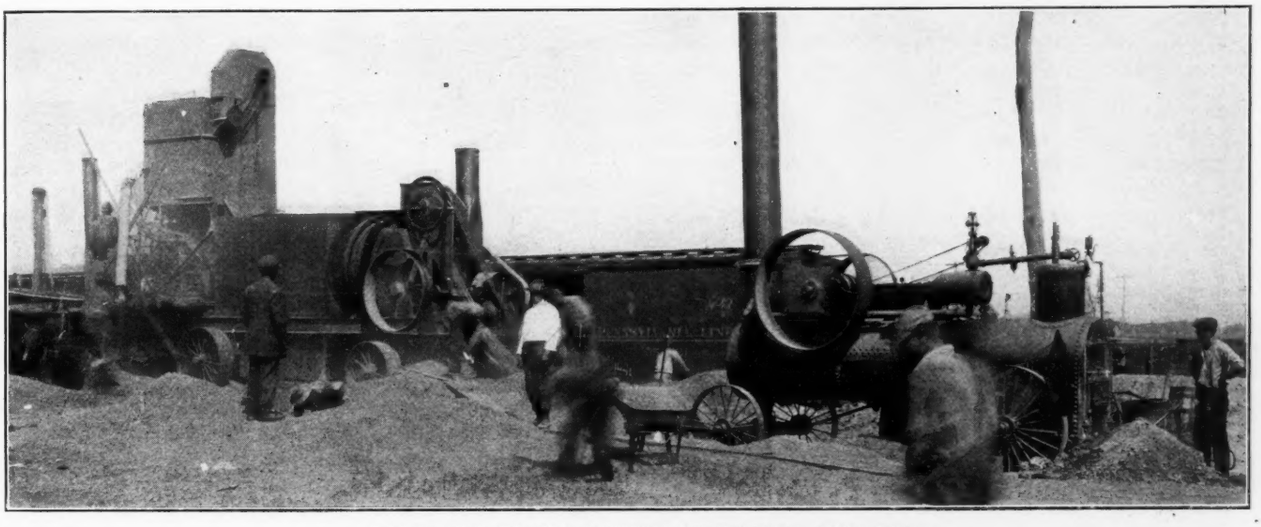


PORTABLE PLANT MIXING ASPHALTIC CONCRETE.

LAYING ASPHALT CONCRETE IN NEW JERSEY

Two Inches on a Six-Inch Cement Concrete Base—Expansion Joints in Base—Description in Detail of Methods of Mixing, Laying and Rolling—Force Employed in Each Process

Under the supervision of the New Jersey State Highway Department, two miles of road between Chrome and Carteret, N. J., were recently surfaced with asphalt concrete, laid on a 6-inch concrete base. The width of the road varies from a minimum of 20 feet to 32 feet in the villages. A 2-inch layer of the mixture was used, with a seal coat on top. Nineteen thousand square yards was required to complete the road, which was placed at the rate of 750 square yards per day. Conrad Siebolt, of New Brunswick, N. J., was the contractor. The amount of the contract was $38,000, the length of the road being about two miles.

Owing to the comparatively level land in this section of New Jersey, there was practically no cut or fill work, and in most places all that was necessary before laying the concrete base was a slight preparation of the subgrade. The soil is largely composed of sand, however, and this had to be thoroughly wet before the concrete was laid.

A rather interesting and unusual point is the construction of expansion joints in the base. Every 50 feet expansion joints constructed of four thicknesses of tar roofing paper were placed to allow for expansion and contraction.

A Ransome concrete mixer furnished enough concrete to lay 300 feet per day of 6-inch base, a 1:2½:5 mix being used. Nineteen men were employed on the mixer—6 stone shovelers, 2 stone wheelers, one sand wheeler, one sand shoveler, 4 concrete levelers, 2 form men, one cement man, an engineer and a foreman. Each barrow man had two barrows, wheeling one up to the mixer while the other was being filled. Edison and Atlas Portland cements were used with local sand and broken trap rock from the Haverstraw Stone Company. The stone was shipped by water to the nearest of the numerous docks along this part of the Jersey shore, unloaded by derrick directly into wagons and hauled in these to the work.

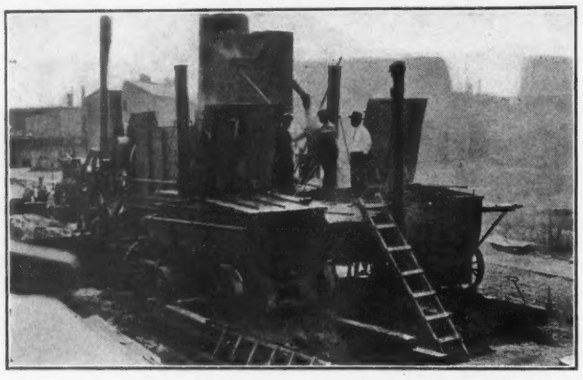
The concrete, after attaining its initial set, was covered with hay and kept moist for five days or more. It was then swept clean in preparation for the Topeka surface.

A Cummer road asphalt plant with a nominal capacity of 1,000 square yards per day prepared the asphalt surfacing, the following proportions being used:

222 pounds of ¼-inch stone,
111 pounds of ½-inch stone,
222 pounds of sand,
50 pounds of asphaltic cement,
5 per cent cement filler.

The plant itself comprises three units—the first including the measuring and mixing devices; the second, the power plant, and the third, the asphalt melting kettle.

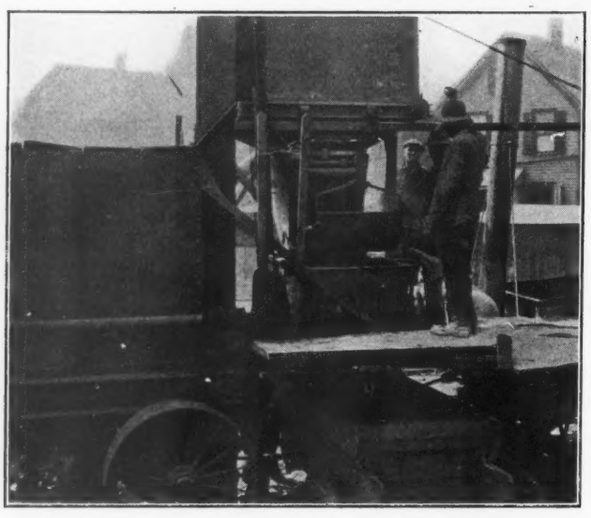
The first unit consists of a sand drum, measuring box, sand bin and asphalt bucket, with conveying and weighing mechanism mounted on a steel truck. The second



REAR VIEW OF MIXER, SHOWING HEATING TANK.

unit consists of a 30-h.p. locomotive type boiler and a 25-h.p. horizontal engine. The third unit comprises two portable melting kettles of 5 tons capacity each, mounted on an all-steel truck.

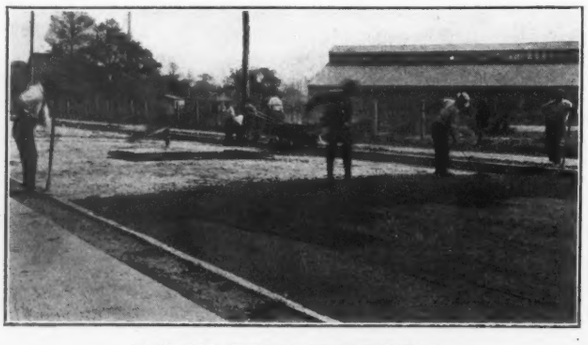
Twenty men were employed at the plant. Eight men were used in shoveling the sand and stone into the buckets of the endless chain elevator that feeds the stone and sand boxes; four men on the mixing and weighing plat-



MIXING PLATFORM, SHOWING SCALES.

form, and, in addition, there were about six helpers, an engineer and a foreman. The total output varied from 700 to 1,180 square yards per day.

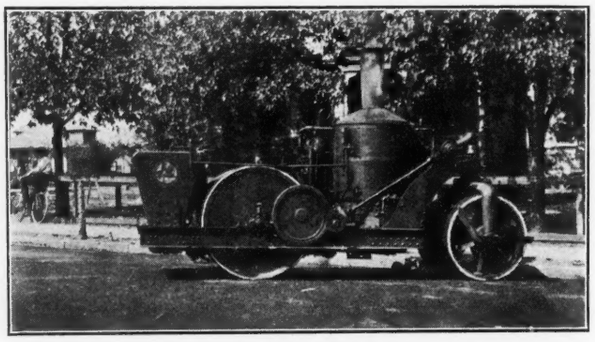
The surface mixture was dumped into wagons, which could be driven under the mixing and weighing platforms and which carried it to the street. Here it was dumped onto a platform and spread evenly over the street by men using shovels and rakes. It was then tamped along the curb with a 30-pound iron tamper,



LAYING SURFACE MIXTURE.
Note method of rolling to break joints.

which was kept hot. An 8-ton Buffalo-Pitts steam roller was then put into service and the surfacing rolled thoroughly, beginning at the curb and rolling toward the center. After this rolling parallel to the direction of the street, additional rollings were given at 45-degree angles to the curb line. In order not to cause a depression in the surfacing, the roller was not allowed to stand idle on the street but when not in use was run either onto a side street or onto the concrete base.

The gang required for spreading and laying the surfacing and applying the seal coat numbered about 18 men—one foreman, one roller man, 2 rakers, 6 shovelers, 2 tampers, one sand spreader, 2 men applying the seal



ROLLING SURFACE DIAGONALLY.

coat and 2 men sweeping the concrete base. Standard Oil Binder "E" was applied as a seal coat at the rate of about one-quarter gallon per square yard, an Eldus spreader being used. After the seal coat was applied the pavement was covered with sand about ¼-inch deep.

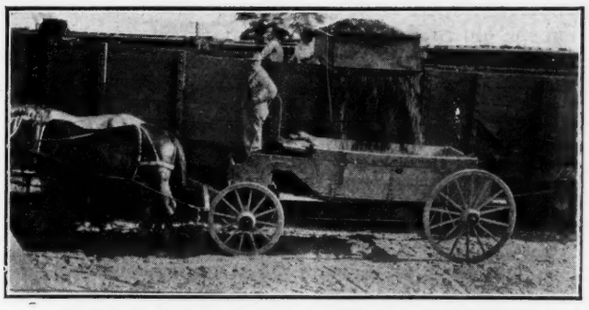
REPLACING MACADAM WITH BRICK

On New York State Highway—Removing Old Bituminous Macadam—Handling Bricks, Sand and Stone—Construction Details

Brick are being used to resurface the old macadam road No. 176 of the New York State Highway Department near Albany, N. Y. The steady automobile traffic on this road, together with the heavy trucking to which it is subjected, has been too heavy for a macadam road during the past few years. The new construction will be brick on a 6-inch concrete base. The road is 1.98 mile long and 16 feet wide. John W. Davitt of Troy is contractor. The contract price is $51,500.

In order to scarify the road, it was found necessary first to remove and pile the bituminous top separately, as it hardened later and made difficult the handling of the other road material if mixed with it. The old macadam was saved to be laid on the sides to form shoulders after the construction of the brick portion of the road. The bituminous binder, which peeled away very readily from the original macadam surface, was rooted up with a plow and scraped with a road scraper to the side of the road and out of the way. The rooter plow was then used again for breaking up the macadam base, and the road scraper was used to remove this material, composed of broken stone and earth, from the roadbed. The subgrade was finished by hand.

About four to six inches of road bed were removed. In some places the depth of macadam was more than this, in which case the bottom part furnished an excellent foundation for the concrete base as well as a good road on which to draw the broken stone, sand and cement. Where all the road metal is removed the loose



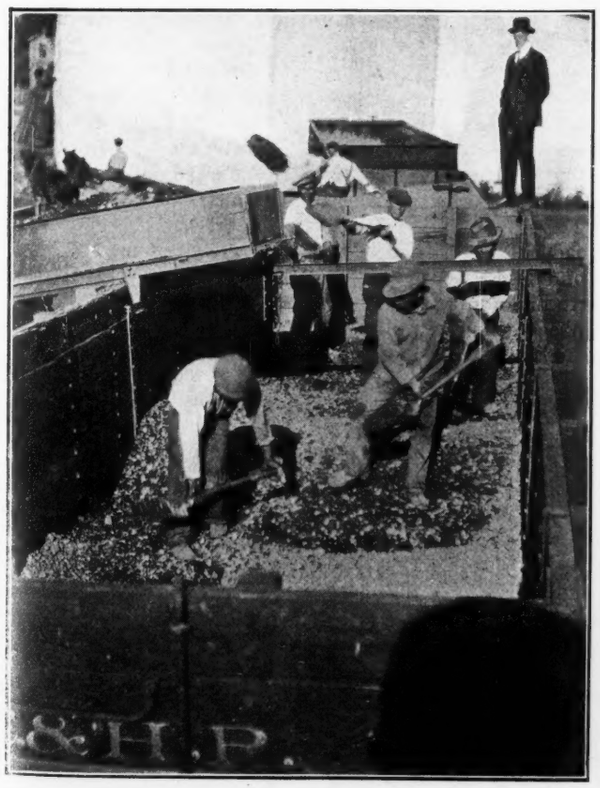
EMPTYING SCOOP UNLOADER INTO WAGON.

deep sand natural to that vicinity is encountered. This cuts up badly under traffic, precludes the drawing of heavy loads and must be regraded before laying the foundation. The sand must be wet thoroughly before applying the concrete base lest it draw too much water from the mixture and weaken it.

In order to take advantage of the best possible roads, the bricks are hauled before the old road bed is destroyed. Porter's "National" block are used. These are shipped, carefully piled in gondola cars, each car holding about 11,500 bricks. Great care is exercised by the contractor in handling the brick and every reasonable effort is made to prevent loss by chipping or breaking.

Six men are ordinarily employed in unloading from the car; four men in the car pick out the brick and place them in reach of the two in the wagon, who pile them carefully in the wagon, one man working at each end. To facilitate unloading, the final space in the center is filled with bricks tossed in loosely. Six men working as above can load a wagon with 500 brick in about 8½ minutes. By handling in this way, practically no bricks are lost by chipping.

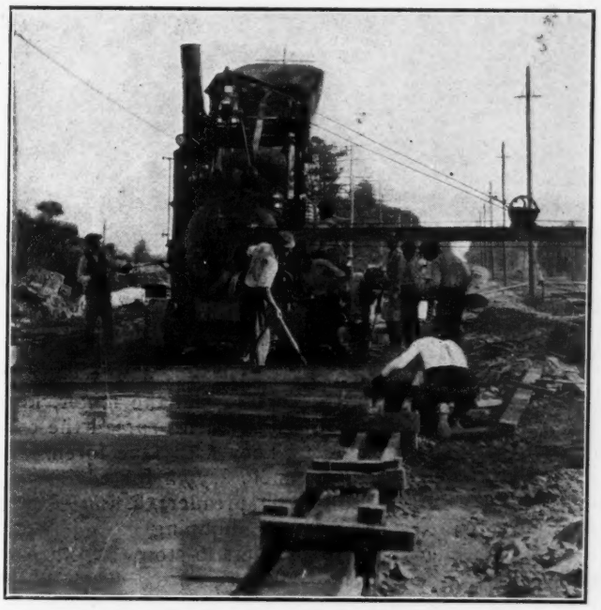
As soon as the wagon is filled, it is drawn out of the way and an empty one run in its place and in turn filled. In this way both men and teams are kept busy.



UNLOADING GRAVEL FROM CAR, USING SCOOP UNLOADER.

The loaded wagon is hauled to the place of unloading, the team unhitched and an empty wagon drawn back to the car. In unloading from the wagons, the same care is observed as in loading. Three men are usually employed in unloading, one man in the wagon handing the brick out to two men who pile them. It requires 18 minutes for three men to unload a wagon, as usually the bricks must be carried across the ditch and piled on the far side. In piling them, care is taken to leave driveways, walks and mail boxes accessible and not to injure trees.

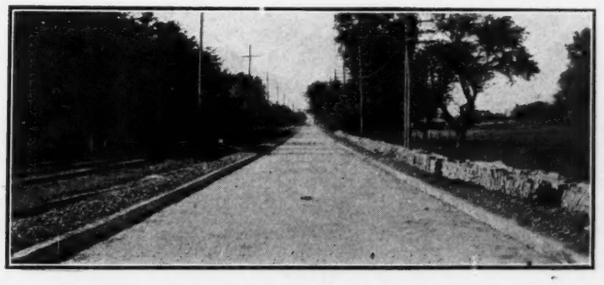
All the sand, gravel, stone and brick are unloaded



KOEHRING MIXER LAYING FOUNDATION
Forms for curb or edging in place.

from a railroad siding near the road. The stone is furnished by the South Amsterdam Stone Co. and the Yost Co. furnishes the sand and gravel. All loading from car to wagon is done by hand and six men can load a one-yard wagon with gravel in five minutes or with the same amount of sand in three minutes. A loading scoop is sometimes used to hold the material shoveled when a full wagon is not immediately succeeded by an empty one, the scoop being dumped into the empty one when it arrives. The time required for scoop loading is slightly longer than for loading directly into the wagon. The time required to load broken stone depends on the size of the stone.

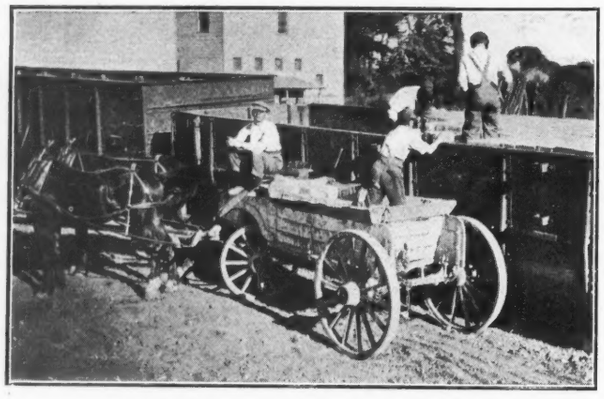
The foundation, which is five inches thick on the sides and seven inches in the middle, is mixed 1:2½:5, Helderberg cement being used. A No. 16 Koehring mixer furnishes enough concrete to lay about 300 feet to 310 feet of base per day. Planks 2 inches by 12 inches, set 17 feet apart, are used as outside forms. An edging or



FOUNDATION READY FOR BRICK.

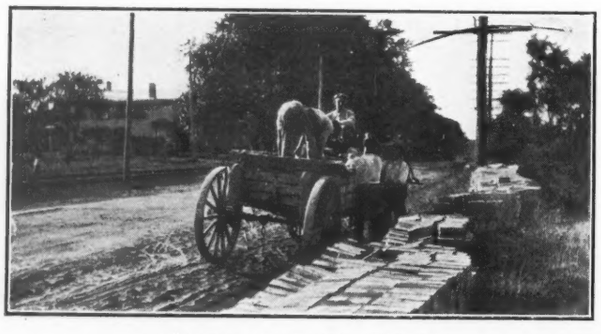
curbing 6 inches wide and 6 inches high is put on by a special gang. Forms for this curb are made from 2-inch by 6-inch planks.

Stone, gravel and sand are brought to the mixer in barrows. In order to facilitate the handling of the barrows and to allow a larger load to be carried, a barrow path, made of strips of ⅜-inch iron 18 inches wide and ten feet long, is laid from the stone and sand piles to the mixer. As the mixer moves along, the strips are pulled back out of the way.



UNLOADING BRICK FROM CARS.

Twenty-nine men are needed to run the mixer, keep it supplied with stone, sand and cement, spread the concrete and build the edging. They are: One foreman, 1 engineer, 1 fireman, 2 form men, 2 men for edging and templates, 2 finishing edgers, 2 spreaders, 2 cement men (carrying cement to mixer and dumping it in hopper), 6 stone shovelers, 2 sand shovelers, 6 stone barrow men and 2 sand barrow men. Rakes are used for spreading concrete and the surface is smoothed off solely by means of the template, no floater or trowel being used.



PILING BRICK ON STREET.

Ten days are allowed for the concrete to set, when a 1½-inch sand cushion is spread and brick laid. Two pavers or bricklayers are usually employed and each man has from 5 to 10 or more helpers, depending on the distance from the brick pile to the road. Each helper carries four brick at once and lays them down just behind the layer, who carries four courses across at once. Men are also placed at the brick piles to lay the brick in piles suitable for carrying. With these helpers a good paver will lay from 20,000 to 25,00 bricks per day.

After the brick are laid, they are rolled and grouted according to the specifications of the New York State Highway Department, which are practically the same as those of the National Paving Brick Manufacturers' Association. The road is then allowed to stand for about ten days, meanwhile being protected by a covering of earth or sand.

After the road is other wise completed, the material from the old road is scraped back against the edging and compacted to form shoulders, which when finished will increase the width of the finished road to about 25 feet.

CALIFORNIA STATE HIGHWAYS*

Progress of Work Up to Date—Method of Financing—Six Per Cent Limiting Grades—Concrete with Bituminous Top

All California is endeavoring to put itself in the best of condition for the World's Fair of 1915, and the state highway commission is by no means an exception, and is adopting extraordinary means to complete every possible mile of road by the time the fair opens. More work has been undertaken by it this year than any other state of the union has ever contemplated in a single season, and everybody connected with the department, from the chief engineer to axeman, is working under high pressure. The monthly estimate for September alone exceeded $600,000.

The highway act under which these roads are being built was passed about three years ago, providing an eighteen-million-dollar bond issue for the state highway system. This called for two main trunk lines north and south through the state, serving all county seats and centers of population by the most direct and practical routes. Although the width of California is much less than its length, it was, of course impractical to run two north and south highways which would pass through all county seats, and those which are not served directly by the highway are tied to it by a system of lateral roads

The work of the commission might be divided into three parts—planning, construction and raising funds. The last was presumably settled by providing an eighteen-million-dollar state bond issue, but financial conditions in the latter part of 1912 were such as to make it impossible to sell its 4 per cent bonds on the general market. Funds previously raised had been practically exhausted, and the work dragged on until the counties of the state were gradually educated to themselves taking up the state bonds on the general plan of each county financing bonds for the work in its own territory. More than thirty counties have already voted to finance the bonds required. In addition to this, counties furnish the rights of way and the bridges, thus increasing the amount of road-building proper which can be completed under the bond issue. Cities and incorporated towns have fallen into line and agreed to build and maintain the connecting links within their limits, thus saving additional millions which are being translated into additional miles of road.

The first few months were devoted to planning the general route of the highways and determining upon the standard details of construction. The first contract was let about two years ago, and, in spite of the delay in raising funds, one hundred and seven sections of road, averaging eight miles in length, are either completed or are under active construction; the surveys for both trunk lines from Oregon to Mexico are completed, and all preliminary office work is practically done. The problem of tying county seats of the Sierra Nevada counties to the nearer trunk line was secondary to the trunk line construction, and the design of these laterals is now under way; the highway commission and its engineers have recently made a personal inspection of the entire project, and survey parties are now at work at practically all

*From a statement made recently by Charles F. Stern, California Highway Commissioner.

points, and next year will see active construction on each of the mountain connections.

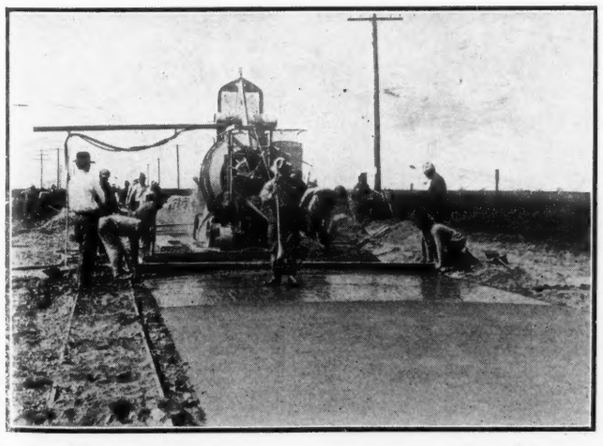
Construction work in the two inner valleys is well along to the south. The valley trunk line is completed through to the Tulare county line, with the exception of two sections now under actual construction. In conjunction with the highway system of Sacramento and San Joaquin counties, this gives a continuous perfect road from the state capitol to the Tulare county line. There was long and bitter discussion in this county as to the location of the trunk line, but this has finally been settled, and the county through a bond issue has made it possible to open two routes through the county which will give it a more usable highway system than any other county. A permanent tie between San Joaquin and Los Angeles is now a matter of months only.

To the north of Sacramento work is in progress on every county traversed by the trunk line. This includes the counties on both sides of the river, up to and including Tehama county, where the east and west trunk lines join, and thereafter continues up the west side to the Oregon boundary.

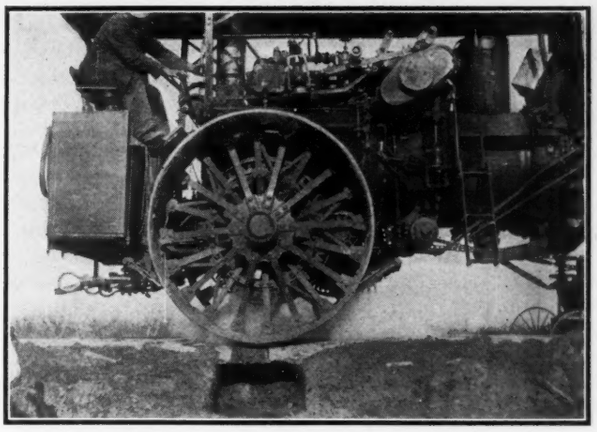
Probably the most spectacular link of the entire system is the bridge across the Yolo basin of the Sacramento river connecting the east and west sides on the direct route between Sacramento and San Francisco. This bridge and its approaches is over three miles long and is said to be the longest structure of its kind in the world. The contract for this bridge has been let and material is being assembled, and it is expected that the bridge will be completed during the summer of 1915.

Throughout the system there are practically no grades exceeding 6 per cent, no sharp or blind curves. Railroad crossings have been eliminated wherever possible, ample provision has been made for drainage, and the location has been established without fear or favor and undeviated by the most powerful influence that could be brought to bear. The type of construction adopted for these highways is concrete with a bituminous top coating. (See Municipal Journal for May 1, 1913, and August 6, 1914.) The commission has tested its concrete paving to the limit. It has placed hundreds of miles of naked concrete under traffic without surfacing to demonstrate its adherent stability. Surfacing is now actively going on in each of the general divisions, and the naked concrete is a thing of the past.

The storms of last winter tested to the utmost the location and construction of the highways, and it was a triumph for both that the state highway, which is the newest transportation line in the state, suffered the least of any.



Courtesy Sacramento Bee.
POURING CONCRETE, CALIFORNIA STATE HIGHWAY.



Courtesy Sacramento Bee.
TESTING CONCRETE ON CALIFORNIA STATE HIGHWAY.

The highway work has been of benefit indirectly to the state in that it has imparted new ideas to the counties as to grades, alignment, character of bridges and "safety first" precautions. Under its influence nearly a score of counties have bonded themselves for permanent road improvement, or are about to do so. The systems which these counties are planning are laid out with reference to the state highway as the backbone, and no better indication of the generally accepted soundness of the state highway construction could be offered than that the county systems are generally being modeled upon the state highway work.

NOTES ON SAND CLAY ROADS*

Climatic Effects—Combining Natural Mixtures—Traffic on Georgia Roads of this Construction

The road problem along the southern Atlantic seaboard is how to overcome the difficulties incident to a surface soil composed largely of fine sand. But it is often possible to find a fair supply of clay a few feet below the surface, though it may contain from 20% to 60% of fine sand. If such material is used, it generally produces fair results and is much better than a sand road. Where the sands are floury and the clays run high in fine grained sand, an alleviation of road conditions may easily be made with this material, although it must not be taken as a satisfactory criterion of sand-clay roads in general.

Climatic conditions in Georgia vary considerably from the southern portion, near sea level and with a mild climate, to the northern boundary in the Blue Ridge mountains at a much greater elevation and in a much more rugged climate. Generally the inferior sand-clays are found in the southern part and the more durable ones in the northern part. In the latter section the winters are not severe, but the ground freezes and thaws all winter, so that the tendency to disintegrate is possibly as great as in the northern part of the United States.

On the better sand-clay roads, weeks of freezing and thawing produce a thin layer of slushy material from ½ inch to 1 inch thick, below which the mixture is quite firm and impervious. Examination has revealed the fact that the surfacing contains scarcely more moisture than in the summer. This seems to prove that impermeable mixtures should be used to protect the subgrade properly in severe climates.

The effect of the various percentages of sand-clay mixtures retained on a 10-mesh screen is a point worthy of study. It is safe to say that, in a sand-clay mixture, the

*Abstract of discussion by JOHN C. KOCH before American Society of Civil Engineers.

greater the proportion of material coarser than that retained on a 10-mesh sieve, the greater its durability and the more suitable its use for service in very cold climates.

Application of hot oil has been proposed for the sand-clay roads in certain counties in Georgia, but it has never been attempted on account of its relatively high cost. The expense for a seal coat of hot oil is as great as the total expense for the sand-clay surfacing and the only advantage that could be claimed would be a slight diminution of dust from automobile travel. The quantity of dust raised on a sand-clay road by an automobile depends largely on the construction of the road. If it is well constructed and of a good class of material, it will yield from one-fifth to one-tenth of the dust raised on a waterbound macadam road under the same conditions.

If natural sand-clay mixtures are available locally, but are not suitable for use alone, because of a deficiency in either sand or clay content, the defect may be corrected by the addition of the proper quantity of sand or clay. This method of treatment will generally be found to be more economical than an attempt to build up an artificial mixture by using sand as a base and adding the proper quantity of clay and mixing. Occasionally it may be possible to combine two natural mixtures in which an excess of sand appears in one and of clay in the other. To determine the proper proportions in which such materials should be mixed, one may make analyses of the materials and plot curves showing their composition. Usually an inspection of these curves will suggest approximately the proportions in which they should be used to obtain the best results. Trial mixtures may be studied in the same way.

The advantage of using a natural sand-clay as a basis for artificial mixtures lies in the fact that the two materials are somewhat thoroughly mixed, and the incorporation of the additional sand or clay will be much more easily effected than when making a purely artificial mixture. In the latter case, the clay forms in clods and balls and thorough incorporation of the two is accomplished only after a long-continued process of puddling.

Information is lacking in regard to climatic effects on sand-clay roads, especially in the north. But there were more than 24,000 miles of sand-clay roads in the United States in 1909 and more than a third of these were in the northern states. Undoubtedly there is no great damage done by frosts or the northern roads would suffer considerably.

The cost of sand-clay roads averages, throughout Georgia, about $500 per mile, which is about one-tenth the cost of macadam construction. The cost of maintenance of sand-clay roads of good quality is very low, averaging $5 per mile per annum. Poorer stretches can be kept in good condition at an expense of from $10 to $30 per mile per year.

The accompanying table gives an idea of the average traffic conditions prevailing on sand-clay roads of Georgia leading to typical county seats or shipping points having a population of less than 20,000. Some roads will average less than this and on about 20% of the mileage the number of vehicles will run to three times the number.

CLEANING ROADS WITHOUT SPRINKLING

Sprinkling Unnecessary and Injurious—Oil Drippings on Dry Bituminous Roads Beneficial—Wearing Action of Wet Grit

The fact that bituminous pavements laid in the city of Providence are not sprinkled with water is a subject that has occasioned frequent comments on the part of visitors to this city who are interested in the maintenance and cleaning of such pavements.

I will say briefly that we are convinced that bituminous pavement maintained in good repair can be kept in a condition more satisfactory to all classes that travel the streets, both afoot and in vehicles, without, rather than with, using water for sprinkling.

We keep them clean by the patrol system, and reasonably free from dust. We believe that the use of water has an injurious effect upon the durability of the pavement. It emphasizes every slight depression and gathers and retains the fine particles that collect on a street, creating an unsightly appearance and a muddy, slippery condition. This results in the skidding of automobiles and a vast increase in the number of accidents.

By keeping the pavements free from water we escape another prolific source of complaint. Upon the best of pavements there will be depressions sufficient to retain a thin sheet of water. The rubber tires of the swiftly-moving auto, and especially the auto truck, will act as a syringe and force the muddy water in a small stream upon the clothing of any one passing along the sidewalk, and even across the sidewalk, covering windows and buildings with muddy spots.

That more might be learned upon the action of water as affecting the durability of bituminous pavements, it would be instructive to bring out the results of laboratory tests, and a comparison of the condition of streets laid about the same time, where water was used and where not. The whole question is a subject worthy of the earnest consideration of all officers that have charge of the maintenance of bituminous pavements.

DISCUSSION ON THE ABOVE PAPER.

Commissioner Slade has presented one of the shortest and what is to my mind one of the most important, comprehensive and useful papers which this convention has received in many years.

From seven years' practical trial, the city of Providence has apparently proved what I believe to be a fact, that street sprinkling, as it is quite generally practiced, is worse than a useless expense. In fact, I believe it to be a relic handed down from past generations and conditions. Providence, a city having a population of nearly if not fully 200,000, has all kinds of street pavements and scarcely any city in the country has them in as uniformly good cleanly condition. Commissioner Slade tells us

*Paper before the American Society of Municipal Improvements, by Walter F. Slade, Commissioner of Public Works, of Providence, R. I., and discussion on same by George C. Warren, of Boston, Mass.

APPROXIMATE TRAFFIC ANALYSIS OF SAND-CLAY ROADS

Type of vehicle.	Average Daily Number of Vehicles (Both Ways.)											
	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Horse-drawn, total	144	216	261	179	144	144	144	170	288	288	179	104
Buggies	20	30	35	25	20	20	20	25	40	40	25	20
One-horse wagon	60	90	100	75	60	60	60	70	120	120	75	40
Two-horse wagon	60	90	120	75	60	60	60	70	120	120	75	40
Four-horse wagon or heavy machinery	4	6	6	4	4	4	4	5	8	8	4	4
Motor-driven, total	20	20	30	40	40	55	55	40	57	57	38	20
Two-passenger automobiles	10	10	15	20	20	30	30	20	30	30	20	10
Four-passenger automobiles	6	6	8	10	10	15	15	10	15	15	10	6
Six-passenger automobiles	2	2	4	6	6	8	8	8	8	8	6	2
Trucks	2	2	3	4	4	2	2	2	4	4	2	2
Ratio, motor to horse-drawn	0.14	0.09	0.11	0.22	0.28	0.38	0.38	0.23	0.20	0.20	0.21	0.19

that this has been accomplished absolutely without sprinkling for seven years on all kinds of pavement, except that waterbound macadam is occasionally sprinkled with oil or oil emulsion. That is an object which other municipalities will do well to emulate.

Fifteen years ago, when most of our street surfaces were macadam and dirt, and the comparatively few modern pavement surfaces were intercepted by macadam and dirt roads, and traffic entirely horse drawn, the sprinkling of pavements to keep down the dirt was essential. Since then there has been a rapid evolution until now much the greater percentage of traffic is motor drawn and rubber tired, which make no dirt. The great majority of the pavement surfaces of our city streets now consist of some form of modern, nearly waterproof pavement. And still we follow the old antiquated custom of keeping the little dirt wet down with street sprinklers, providing a muddy, nasty surface which cannot be thoroughly cleaned and necessitates more sprinkling and more mud, until the gutters become receptacles of mud, and if the pavement surface ever gets dry the cry goes up, "Where is the sprinkling cart?"

We not only have the benefit of the seven years' experience of Providence but we have our country roads for an object lesson. Last week I took a 250-mile automobile ride over the bituminous surfaced country roads of Massachusetts, which have never been sprinkled and most of them never cleaned. There had been no rain for at least three weeks and I did not find a dirty road on the entire trip. A week before I had a similar experience over one hundred miles of bituminous road surface in Connecticut. This, notwithstanding that the country road surface is generally only 16 feet wide, with a similar width of dirt "shoulders" on either side, while our city streets are paved with a naturally clean surface from curb to curb. Why is this? It is simply because, if the dirt is not wet down as fast as it forms and thus caused to accumulate, as soon as an imperceptible dirt particle forms on the road surface it is picked up by the natural wind and rapidly moving automobile and thrown aside and in such small quantities that it is imperceptible and unnoticed and therefore does no harm.

Another important point is that if bituminous pavement surfaces are dry and clean, the oil which drops from automobiles is quickly spread by auto tires to an extremely thin sheet which not only preserves the pavement surface but the slight amount of oil takes up the fine dust and materially helps to prevent the pavement surface from ever becoming dusty. If the pavement surface is wet, these valuable effects of the slight dropping of oil from automobiles is entirely lost.

Of course in the case of city streets it is necessary, as Providence has done, to inaugurate a daily patrol system of street cleaning to pick up the horse droppings before they can become converted into dust, and to work around the intersections of unpaved streets, if any. Some one or more of the systems of pneumatic cleaning machines, now in the process of development, will surely soon be a practical success, but until then street washing at night is necessary under some conditions but not generally so. I believe that such a system of dry cleaning by hand patrol is less costly than the antiquated street sprinkling, supplemented by the street sweeper trying to do the impossible—thoroughly pick up the accumulation of mud. Even if dry cleaning were not cheaper, its greater efficiency in keeping street surfaces in better condition for use by automobiles, horse and foot passengers, merits its adoption, to say nothing of the far greater durability of all forms of street pavement surfaces when dry than when wet. It is generally conceded that water is the worst enemy of pavement surfaces. When the water is applied in the form of wetting down an accumulation of dirt subjected to steel-tired traffic, we have the condition which from all ages has been known to wear the hardest steel and is therefore used in the grindstone and for sawing stone, to-wit: the application of mud under a grinding process.

While some forms of pavement are doubtless more affected by water and mud than others, it injuriously affects all classes of pavement, and I will not except stone, even granite blocks, the wearing of which to a "turtle back" surface I believe to be primarily due to slight absorption of water.

I believe that repairs required by all classes of pavement are more generally the result of wetting down the dirt, leaving the surface in a continually more or less muddy condition, than of the traffic, or rather what would be the traffic under dry, cleanly conditions. A city or street in or on which sprinkling or other method of continual wetting of the pavement surface has not been practiced is almost universally one where the pavements are the best of their kind, no matter what form of pavement construction is used.

Washington, D. C., has the enviable reputation of having the most durable pavements of all kinds. For many years the system of cleaning in Washington has been hand patrol without sprinkling, except a very light sprinkling—just enough to lay the dust but never to convert it into mud—immediately in advance of the night sweeping.

Fifth avenue, New York, is always dry except during rains, and it is one of the most durable asphalt pavements in the world. Fifth avenue provides an excellent example of the lack of the necessity of sprinkling any street, however much traffic it carries. The traffic on this avenue is so concentrated that it would be impracticable to run sprinkling wagons over it even if the city desired to do so and yet the pavement is always clean and never dusty.

A simple object lesson is the fact that when, contrary to a practice of keeping pavement surfaces continually wet down by sprinkling wagons, a portion of the surface has become dry for a time, it is found to be clean while the still wet portions of the surface are still covered with a nasty, slimy, slippery mud.

The asphalt pavement on Alexander street, Rochester, in the laying of which I was plant foreman in 1884 and 1885, is still in existence and has a record for low cost of repairs (which has been repeatedly referred to in reports of this association) and has until quite recently been free from street sprinkling. I was in Rochester about ten days ago and found the sprinkling cart had gotten in its work on Alexander street and it is now rapidly deteriorating. Rutger street, Utica, laid in 1886, has been through a similar experience of no sprinkling. Michigan boulevard, Chicago, from Jackson boulevard to 10th street, paved partly with creosoted wood blocks and partly with asphalt, was always in a dry condition and carried a very heavy traffic for ten years and was in good condition when, about four years ago, it was removed on account of widening the street, necessitated by the great increase in volume of traffic.

The bituminous pavement on Michigan avenue, Chicago, is now nearly five miles long. By actual count on July 26, 1912, it then carried a daily traffic of 11,425 vehicles, which has probably now increased to at least 14,000 vehicles per day. The pavement surface is always clean and never sprinkled or cleaned other than by patrol cleaning except as to narrow strips, about four feet wide, which are sprinkled and hand broomed at night to remove the slight dirt which naturally collects near the curb. Other boulevards in Chicago are similarly treated

and confirm what is said above regarding New York City and further confirm the experience of Providence and the statement made above that a modern pavement surface requires little cleaning and will always be clean if it is only kept dry and hand patrolled through the day.

I hope the day is not far distant when our cities generally will adopt a modern system of street cleaning without sprinkling, following the recent revolution from dirt streets to modern pavements and from horse-drawn to motor traffic. Providence has led the way. Other cities will do well to follow.

The cleaning effect of automobiles above referred to is doubtless accounted for by the combination of speed of the automobile and the current of air thrown on the pavement surface by the engine exhaust. Consequently when cleaned with a system of hand patrol a street pavement surface in reasonably smooth condition never gets dirty, or at worst never gets so dirty that it cannot be cleaned at night without sprinkling during the day.

ROAD CONSTRUCTION BY CONVICTS IN VIRGINIA

Building Gravel and Dirt Roads for About $1,000 a Mile—Design and Construction Details—Use of Convicts

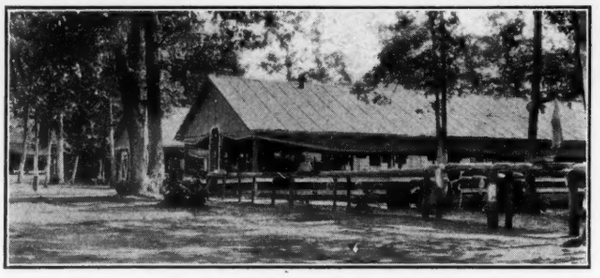
Two of the main difficulties encountered in roadmaking in the south are the lack of proper roadmaking materials and the insufficient supply of dependable labor. Whatever free labor can be obtained is hard to hold more than a few weeks, while at some seasons of the year it is impossible to get any labor at all. And of road material there is practically none in Virginia except occasional deposits of gravel or clay. Consequently roads must be built of either gravel, soil, or sand and clay, or of imported material, which is prohibitive in cost.

However, the soil of Virginia is better adapted for the building of natural soil roads than that of most other states, and where money for road work is scarce, dirt roads form a cheap and satisfactory highway. With the use of convict labor these roads can be built at an average cost of about $1,000 a mile. With a little dragging a couple of times a year and with some slight attention to the ruts and ditches, these roads will give good service for a long time.

Gravel roads also are popular in sections of Virginia and at a slightly higher cost give a road with somewhat bettering wearing qualities. Both soil and gravel roads are cheap, easily constructed and need neither expensive machinery nor skilled labor for construction. With convict labor the cost of construction has been brought as low as $325 per mile for soil roads, but the cost of either soil or gravel will average nearly $1,000 per mile of 12-foot roadbed.

Convict labor for road purposes is finding more and more favor in the South and, of late, long term men, as well as the "short termers" or county jail men, are being

GANG OF TRUSTIES MAKING A CUT.



CONVICT CAMP—THE "CELL."

employed. While the convict has only two-thirds the efficiency of free labor, there are certain other advantages that compensate for this. It is better for the convict himself, and most of them prefer road work to confinement. He can be kept at work long enough to acquire a certain familiarity with the work. He is under better discipline. It is also cheaper, as the total expense runs to only about 50 to 60 cents per day, most of which is for food and guarding. Estimated unit costs are:

	Per day.
Food	.25
Guard	.20
Clothing	.03
Miscellaneous	.04
Average cost of convict per day	.52

A gang of 41 convicts was employed last summer on the Spottsylvania Court House—Mantico road and on the construction from Snell's bridge to Davenport's bridge. Of these 41 convicts, 15 are trusties, while 26 are rated as "gun-men," or ones who must be guarded at all times. To take care of these, 6 wardens and one keeper are required. Guards watch over the convicts while at work during the day, and at night all are chained to a long chain, which in turn is securely fastened to some immovable object. The building in which they are con-

SHAPING THE ROAD WITH THE SCRAPER.

fined is known as the cells and is merely a long tent with a board floor and a galvanized iron roof. The other buildings, three in number, are of the same construction.

This party of laborers completed 2.31 miles of road from Spottsylvania Court House to Mantico in about three months. There were 2,206.6 days of convict labor charged to the road at a cost of $1,272.41, or about 57.7 cents per convict per day. The total cost of this section of the road, including maintenance of the convict force, was $4,297.49, or at the rate of $1,860 per mile. This road was 20 feet wide and surfaced with 16 feet of gravel. The cost of construction of this road was borne jointly by the county, state and national government. The state furnished the convicts and paid for their keep and for guarding. The federal government pays one-third the remainder and the county all the rest.

Figures on 2.75 miles of the road from Snell's bridge to Davenport's bridge are also at hand. On this stretch

the gravel surfacing is only 12 feet wide. There were 1,482.8 convict-days employed at a cost of $708.85, or 47.8 cents per convict-day, a very cheap rate. The total expenditure on this road reached $2,811.84, or about $1,-022.60 per mile. The cost of this road was borne jointly by the state and county, the state furnishing the labor and the county paying other costs.

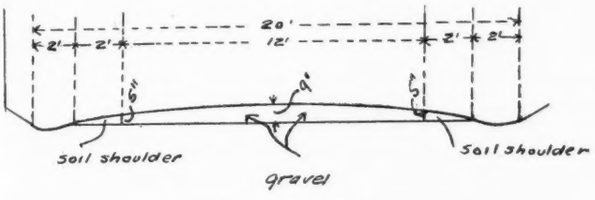
Both soil and gravel were used in various places on these roads. The gravel was obtained from local banks and the soil was dug from the ditches, banks, etc. The local soil in Spottsylvania county is gray in color and contains about 75 per cent of sand, some gravel and the rest clay. When dry, this compacts into a fairly good road with a hard wearing surface; but when saturated with water, it turns into a soft, sticky mass. When thoroughly wet, Virginia roads of the old style are unfit for use. Therefore in new road construction, when using natural soil for road purposes, adequate provision must be made for drainage, a crown of 15 inches being used on a road 12 feet wide. With gravel roads, a much smaller crown may be used.

COMPLETED ROAD OF LOCAL GRAVEL.

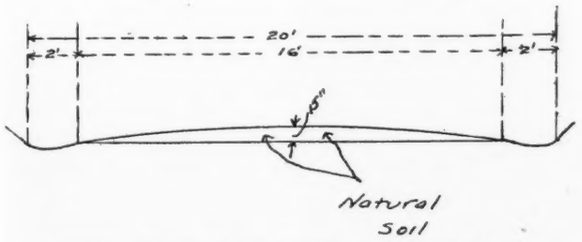
In the construction of these roads practically no hand work is done. The absence of stones and boulders makes easy the use of road scrapers and road machines. The ditch of the road is first plowed out so as to give a width of roadway of 20 feet. A road machine then works the material out of the ditches and shapes the soil into a roadbed 14 feet wide; with shoulders 2 feet wide on each side and a crown of 15 inches. From motives of economy, no rolling is done, although rolling and sprinkling would compact the road better.

While a crown of 15 inches seems high, it is a compromise between one high enough to shed the water completely from the road and one low enough not to cause washing of the road. Moreover, in a year or less four or five inches of this crown will wear off and pack down.

The gravel roads are constructed in much the same way as the soil roads. The subgrade is prepared and made flat and gravel is placed on this subgrade to a depth varying from 9 inches in the center to 4 inches on the sides. Local gravel from ¼ inch to 3 inches diameter is used. If necessary, it is screened before using.



CROSS SECTION OF GRAVEL ROAD.



CROSS SECTION OF NATURAL SOIL ROAD.

Both vitrified clay and galvanized corrugated iron pipes 18 inches in diameter, are used in culvert construction. A 1:3:6 mixture of Old Dominion portland cement is used in this work. For larger culverts, the Virginia State Highway standard with Havemeyer bar reinforcement and a 1:2:4 mixture is used.

On the same strip of road is a 111-foot 3-span bridge across a river. Fifteen-inch I-beams resting on reinforced concrete piles are used in the construction of this bridge.

No grade of more than 5 per cent is allowed, and on account of the uniformly level character of the country, there are few places where any cutting or filling need be done. Except in rare instances, the new road follows the old one, thus lessening the cost to some extent.

ROAD OILING IN PASADENA

Three Classes of Oil-Mixed Surface—Oil Purchased by City and Sold to Contractors—Special Sprinkler Used

By FRANK REED.

The standard specifications of the city of Pasadena, Cal., for road work using oil provide for three classes of work; the first two for oiling one-inch and two-inch pavement, respectively, and the third for an oil macadam. The first specifications cover any necessary grading required to bring the surface to the required subgrade, moistening and rolling this to a condition of firmness and leveling depressions. When the street superintendent has certified that the subgrade has been brought to the proper grade and cross-section, the wearing course, consisting of a one-inch layer of crushed stone, is placed and rolled and then oiled at the rate of one gallon per square yard; following which rock screenings up to one-quarter inch are spread to a sufficient depth to take up all the surplus oil, watered and rolled to a hard and smooth condition.

The second class of road requires a similar preparation of the subgrade, then the laying of a 1½ inch layer of crushed stone rolled to an unyielding condition, after which liquid asphalt is applied at the rate of three-quarters of a gallon per square yard. When this base has been accepted by the street superintendent, a layer of crushed rock passing a one-inch screen and held on a one-quarter inch and graduated in size is spread to a thickness giving one-half inch when rolled; after which a gallon of oil per square yard is applied, followed by a layer of one-quarter inch screenings, and the surface is rolled to a hard and smooth condition.

The so-called oil macadam includes preparation of subgrade and a broken stone foundation brought to within one inch of the finished surface, which foundation is sprinkled and rolled to an unyielding condition. Upon this, three-quarters of a gallon of oil per square yard is applied, followed by broken stone to a thickness which will give the finished grade to the pavement when rolled. Upon this is applied oil at the rate of three-quarters of a gallon per square yard followed by a light coating of rock screenings, which is then watered and rolled to a hard and smooth surface.

The oil used is specified to be a heavy asphaltic residual resulting from the distillation of California products, free from water and sediment and not containing a mixture of any residues obtained from the artificial distillation of coal, coal tar or paraffine oil. After being freed from

water the oil must contain not less than 92 per cent. asphalt, having a penetration of 80 at 77° F., District of Columbia standard. Residual asphalt must be at least 99½ per cent. soluble in pure carbon bisulphide, and this bitumen solution must be at least 99 per cent. soluble in an iodine solution. A test for viscosity also is described in detail.

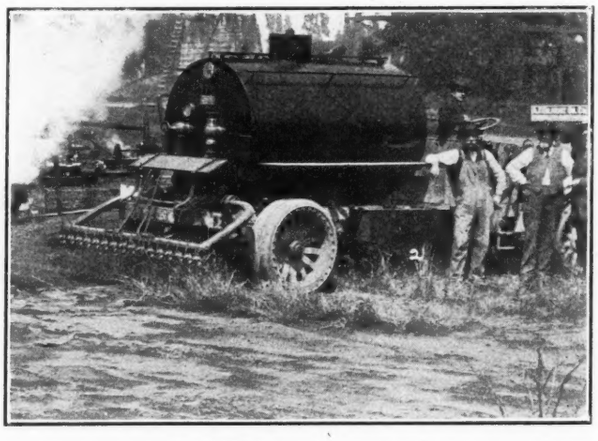
The city, in pursuance of a road policy developed by T. D. Allin, commissioner of public works, has not only adopted specifications for the oil used in its highway work, nor does it confine itself to testing samples of this, but it purchases the oil outright, stores it in a so-called oil pit, and sells it to contractors who are awarded street work. By this policy it absolutely assures the use of a standard oil. It was found, however, that not only the oil but its method of application was very important, and the city has recently purchased a motor driven oil distributor which gives more complete control and greater regularity and penetration in the distribution of the oil than was possible by hand or ordinary horse sprinklers, and rents this truck to contractors for doing the city road work; the rate charged being $3 per hour, including the driver and operator. In this way both city and contractor receive the benefit not only of the more effective machinery, but also of the experience of the driver and operator, who are constantly employed on this work. A contractor arranges with the street department for the use of the truck at a given time and also with the city chemist who is in charge of the oil pit to have the oil heated and ready for loading at the time the contractor takes charge of the truck.

One observation of the truck in actual service showed that it took seventeen minutes to spread 950 gallons, the capacity of the truck, when running at the rate of two miles an hour. The time taken to empty the tank varies of course with the penetration and quantity of oil to be spread per yard. It is found in general that while a horse and wagon tank could serve but one contractor in a day, three contractors per day can be served by the truck. The city does some small work and takes its turn with the contractors and charges itself the same rate for the use of the truck. It is proposed at the end of the year to figure up all costs for operation and repairs, with depreciation and insurance, and see how it compares with the income of $3 per hour. When the calculation has been made, the charge for the truck will be readjusted if necessary so as to be compensatory to the city but not profit-making; the advantages desired being not a profit from operating the truck, but better highways.

It is found that the sufficient and even distribution of oil without streaks which is obtained with the use of the truck tends to produce a better bond in the oil macadam. The contractors, when distributing oil with horses, in order to be sure to get the specified quantity of oil everywhere, usually exceeded the average amount required and had to pay for the excess. When using the truck they secure such close adjustment that it is figured that a saving of nearly 25 per cent of oil can be secured and still get the desired result. Another advantage is that when the sprinkler was horse-drawn, part of the oil in the tank got cold before it was used up. The new tank not only covers the ground more quickly, but its construction so retards the loss of heat that this is very rare in the case of truck service.

Some cost figures obtained on work done since the truck was put in operation showed the following comparison between truck and wagon performance; On two adjacent blocks of highway which correspond in every way except in length, one block of 23,760 square feet was covered by the truck in three hours, at a cost for the truck of $9, or .0378 cents per square foot; while the wagon distributed oil over 32,260 square feet in twelve hours at a cost for the wagon of $13.50, which gives a cost of .0418 cents per square foot.

The truck used by Pasadena consists of a 4-ton Peerless truck chassis operated by a 4½ by 6½ motor and has a four speed transmission with a ratio of 41 to 1 on the low speed. This carries a tank of 950 gallons capacity; also a pump housed inside the tank for discharging the oil under pressure. The tank is filled through a dome at the top, and should the oil not be shut off promptly when the tank is full, any overflow is taken care of by a pipe running vertically through the bottom of the tank and terminating at a point near the top, open at both top and bottom, through which the surplus oil flows out to the ground beneath the truck. In this way cleanliness of the tank covering is maintained, which is believed to be useful, not only in maintaining the good appearance of the equipment but in keeping up the men's pride in their machine so that they give it better care mechanically. The tank proper is covered with a jacket, and magnesia insulating material is placed between the two which insures a very moderate loss of temperature while the oil is in the tank, except, of course, for the immediate loss of a few degrees caused by the heating of the tank itself when first filled. Temperature tests of the oil can be made at any time by inserting a thermometer into an iron



PASADENA ROAD OILER.

tube with a closed inner end which slants downward within the tank from an opening at the rear.

On reaching the street to be oiled, the operator takes his place on the running board at the rear of the nozzle header and starts the oil pump, which is located within the tank at the front end. This is a rotary pump which is run on a ball-bearing shaft by a sprocket and chain connected to a jackshaft driven through a friction clutch by the truck's transmission system. The same driving mechanism, which is at the forward end of the truck, is also adapted to operating a dumping mechanism for a truck body which may be substituted for the tank body when occasion requires and used for hauling gravel or other road material. The driving mechanism is independent of that which propels the truck, and the pump can therefore get power whether the truck is in motion or not and at a rate independent of its speed.

The pump discharges the hot oil through a pipe running through the center of the tank to a valve on the left of the operator. The oil passes down through a pipe on the left which communicates with the nozzle header, across the header and back into the tank through a pipe on the right, thus maintaining circulation and hot oil in the header independent of the discharge through the nozzles. On the right-hand pipe is a spring-loaded release valve by which the operator adjusts the flow, allowance being made for a drop of from 3 to 5 pounds

when the nozzles are opened. The cocks are two-way, with large and small nozzles. Both nozzles are cut off when the cock handles are vertical, moving the handle to the right opens one nozzle, to the left opens the other. The cocks are purposely made as short as possible with considerable metal and are screwed directly into the header with a short coupling which is welded into the header. They are soon warmed by the heat of the oil circulating in the header. The effect of this construction is that work can be started on the road without any necessity for spraying out and wasting considerable oil to warm the nozzles or drive hardened oil out of them. The rotary pump, being located inside the tank, is always hot and ready for business, obviating the necessity of washing with distillate after the discharge of each tank of oil.

Oil is placed upon the highway at a temperature of about 315 degrees at a pressure varying from 15 to 30 pounds, according to the quantity and penetration desired. The quantity is controlled by regulating the pressure in combination with the speed of the truck, in which way all necessary flexibility in operating is obtained. The truck has four speeds, one a very low speed and the second twice as fast. A governor gives very close regulation. In practice, the truck is run on one of these two low speeds at the full speed allowed by the governor, so that a constant rate of travel is obtained. With the valves set for a distribution of one gallon per square yard at the lowest speed, the next speed would give one-half gallon, and three-quarters of a gallon would be obtained by regulating the pressure. The pressure is controlled by manipulating the left-hand feeder pipe and the right-hand pipe which conducts back to the tank the surplus oil not forced out through the nozzles. Decreasing the tension of the spring in the right-hand valve relieves the pressure at the nozzles. A Fairbanks-Morse gauge above the left-hand pipe shows the pressure in that pipe. A dial at the top of the rear casing of the tank is operated by a simple float gauge in the tank and indicates the amount of oil in it.

The cocks each have two openings, one for heavy and the other for lighter distribution of oil. They have no appreciable atomizing effect but throw the oil in a conical sheet. The header may be raised or lowered by the operator. If it is adjusted so that the intersection line of alternating nozzle discharges is at the roadway, the greatest penetration and evenness of distribution will be secured. The nozzles are in two banks, each 4 feet wide. A lever controls each bank as a unit, and there is also an individual nozzle control, thus making it possible to oil any width desired from 8 feet down to a streak covered by one nozzle, as is often necessary in maintenance work on old roads.

The clutch controlling the pump is operated by the man on the running board. A relief valve within the truck on the pump discharge is set at 50 pounds. The pump is so mounted within the tank that its working parts may be removed for repairs by taking out a front plate, even while the tank is full of oil. The normal pump intake is from a sump at the bottom of the tank through a three-way cock, which may be turned to close the regular intake and connect the pump to a pipe extending to the outside of the tank, to which may be attached a hose from an oil pit or from another truck, should it be necessary to remove the contents of the latter while out on the road.

The tank has running boards, hand rails, and a cover for the dome fastened by a chain so that it cannot be thrown away or lost. The board on which the operator stands may be turned up so that the truck can be backed close to any object. The entire equipment was made from designs drawn by W. B. Cannon of Los Angeles, the chief road oiler of Los Angeles county, based upon his experience with two motor tank trucks operated upon the Los Angeles county roads. So far as is known, the rotary pump used is of a type which has never previously been used except on Los Angeles county work.

Usually it is not necessary to do any patching, as very few streaks are left by the truck. Should one be left, due to dirt getting in the nozzles for instance, the patching oil can be distributed from the truck run alongside the faulty section by means of a hose and sprayer. This secures penetration, which the old method of pouring from a bucket did not do.

When the truck is not in use for handling oil, the tank body may be lifted off by means of tackle inserted in ring bolts provided for the purpose, and a gravel body attached within two hours or so, to be dumped by the driving mechanism as previously described. This oil spreader complete cost about $5,500.

REGULATION OF STREET TRAFFIC

State Has Right to Exclude Automobiles from Streets and Highways—May Confer Authority Upon Municipalities—Reasonableness Necessary.

By JOHN SIMPSON.

The following decisions dealing with the right of Legislatures and municipalities to exclude automobiles from the use of streets, highways, boulevards, etc., show that the Legislature may in its discretion prohibit the use of the public highways by automobiles and that municipal corporations may by ordinance do so when their statutory powers are sufficiently ample:

In 1909 the Legislature of the state of Maine passed a statute providing that "no automobile or motor vehicle shall be set up, used, driven or operated in or on any highway, townway or public street within any of the towns of Eden, Mount Desert, Tremont and Southwest Harbor, on the island of Mount Desert, in the county of Hancock, state of Maine." The town of Eden passed an ordinance which was challenged as being unconstitutional, and as operating against a class only. It was held that the ordinance was general and not special, for it applied equally to all automobiles without discrimination. It was held that the regulation was within the police power of the Legislature to make reasonable regulations respecting the use of automobiles on the public highways in order to secure the public safety. "In certain sections of our state," the court said, "such, for example, as Mount Desert Island and the vicinity of Bar Harbor, public highways have been constructed along precipitous mountain sides, through circuitous defiles, over deep ravines and on the very edges of ocean cliffs. They have been so made to afford access to some of Maine's famous and picturesque scenery. The use on such ways of the powerful, swiftly moving, and dangerous automobile must necessarily endanger all who travel thereon, and especially those who ride in carriages drawn by horses. Presumably to safeguard the people against such dangerous conditions, the Legislature decided that the ordinance in question might be made. It seems reasonable and expedient; but as to that the judgment of the Legislature is conclusive." State v. Mayo, 106 Me., 62, 75, Atl. 295. This language was quoted with approval in State v. Phillips, 107 Me., 249, 78, Atl. 283 (1910), a criminal prosecution of a resident of Southwest Harbor, which town did not accept the act, for a violation thereof. It appeared that the town of Southwest Harbor is so situated that closing the roads of Mt. Desert and Eden to the use of automobiles and motor vehicles makes it impossible for the owners thereof, residing in Southwest Harbor, to leave that town and the island of Mt. Desert by the town and county roads, without passing through some portions of the towns of

Mt. Desert and Eden. The defendant contended that for this reason, and also because the statute made a distinction between the towns in question and other towns throughout the state which was arbitrary and unreasonable, and not necessary for the promotion or preservation of the public health, safety or welfare, the statute was in violation of the state and federal constitutions. It was held, however, that the statute was constitutional, and that it is now a well-settled rule that in the absence of any constitutional restriction or limitation, the Legislature of a sovereign state, in the exercise of its police power, which extends to the preservation of the "lives, limbs, health, comfort and quiet of all persons, and the protection of all property within the state," has the right to prohibit automobiles from passing over certain streets or public ways in any city or town.

The Prince Edward Island Supreme Court holds that the Legislature of that Province may prohibit the use of automobiles on the highways of Prince Edward Island. In re Rogers, 7 East, Law Rep. 212.

A regulation designed to restrict a public boulevard to pleasure driving, excluding all business uses, except such as necessity demands, has been held reasonable. Clausen v. De Medina, (N. J.) 77 Atl. 1045. In this case the boulevard commissioners of the county of Hudson, New Jersey, adopted a rule regulating the use of the Hudson County boulevard which excluded all vehicles used for business purposes except where they were required to go upon the road to deliver and receive a load, in which case they must leave the boulevard east and west, at the nearest traveled cross street. It was held that the rule was not inconsistent with the power of regulation conferred upon the board by statute. The fact that the rule allowed the use of the boulevard by business vehicles of a designated weight when driven for pleasure did not make it unreasonable.

The Massachusetts statute of 1905, c. 366, § 1, as amended by the St. 1906, c. 412, § 9, authorizes board of aldermen in cities and boards of selectmen in towns to "make special regulations as to the speed of automobiles and motor cycles, and as to the use of vehicles on particular roads, including their complete exclusion therefrom." These regulations must be published in one or more newspapers and posted conspicuously on sign boards. On protest in writing within sixty days, made by not less than fifty residents of Massachusetts at least ten of whom are taxpayers of the city or town, the Massachusetts highway commission, after notice and a hearing, may approve the regulations, and if there is such a protest the special regulations are of no validity without such approval. St. 1907, c. 203, prescribes penalties for violation of the regulations. These statutes were upheld as constitutional by the Massachusetts Supreme Court. The Legislature, it was held, has the right, acting under the police power, to prescribe that automobiles shall not pass over certain streets or public ways in a city or town. The expediency of the regulations was based upon the danger to the occupants of automobiles and to other vehicles and their passengers on steep and narrow roads. A precedent for the application of the principle was found in Com. v. Stodder, 2 Cush., 562, a case relating to an ordinance of the city of Boston, prescribing the streets on which certain omnibuses might be run and excluding them from other streets.

Under the New York city charter the board of aldermen have power to regulate the use of the streets for the exhibition of signs and advertisements, and to make such regulations in reference to the running of stages and other vehicles as may be necessary for the convenient use and accommodation of the streets. It is held that they were authorized to pass an ordinance prohibiting the display of advertisements upon wagons and other vehicles, except business notices upon ordinary business wagons engaged in the usual business or work of the owner and not used merely or mainly for advertising. Fifth Ave. Coach Co. v. City of New York, 194 N. Y. 19, 86 N. E. 824, affirming 126 App. Div. 657. And under the charter provisions conferring powers on the park department of the city of New York, it is held that that department had power to adopt a regulation prohibiting the use of any vehicle along any park or parkway measuring over 10 feet from the tread of the wheel to the highest portion of the vehicle. People v. Shellenberg, 133 N. Y. App. 79, 117 N. Y. Supp. 820.

In California, in 1905, a county ordinance which, after prohibiting the use of automobiles on certain parts of some of the public roads of Marion county, Cal., provided that no person should run an automobile on any of the unprohibited highways between the hours of sunset and sunrise, was held not to be unreasonable.

"Of course," the court said, "if the use of automobiles gradually becomes more common, there may come a time when an ordinance like the one here in question would be unreasonable. As country horses are frequently driven into cities and towns, many of them will gradually become accustomed to the sight of automobiles, and the danger of their use on country roads will grow less. Ex parte Berry, 147 Cal. 523, 82 Pac. 44.

An ordinance passed by township commissioners prohibited the driving of automobiles over a portion of a highway on the ground that it was dangerous and unsuitable for the use of motor vehicles. In proceedings for violation of the ordinance the trial court held the ordinance invalid. "While the legislature," it said "may by statute exclude automobiles from the public roads of the commonwealth, or confer the authority to do so upon cities, boroughs or townships, it has not done so, and until such legislation is enacted there is no law that we know of that either prohibits or authorizes municipalities to prohibit the use of motor vehicles upon the public roads of the commonwealth." This was affirmed on appeal, the appellate court citing the case of Scranton v. Laurel Run Turnpike Co., 222 Pa. 82, 73 Atl. 1063, where a turnpike company was held without authority to exclude automobiles from passage over a road situated much like that in the present case. Walker v. Corn, 40 Pa. Superior Ct. 638. A New York statute, Laws 1904, c. 538, § 4, subd. 3, prohibits local authorities from passing or enforcing ordinances excluding or prohibiting any motor vehicle, whose owner has complied with the state law relating to licenses, from free use of the highways, except such highway, speedway, or road as has been or may be expressly set apart by law for the exclusive use of horses and light carriages. The province of Quebec has a statute couched in similar language, 6 Edw. VII, c.

COST OF STREET REPAIRS IN CHICAGO.

The Chicago municipal asphalt plant has effected a decrease in cost of repairs and during 1913 asphalt pavements were repaired at a cost of 81.1 cts. per square yard, or of 87.1 cts. per square yard allowing for plant depreciation and interest on investment. At a total cost of $62,637.03, or $1.175 per square yard, 53,342 square yards of brick pavements were repaired. Granite block pavements to the extent of 59,345 square yards were repaired at 53.2 cts. per square yard, or a total of $31,593.04. Macadam pavements cost 12.16 cts. per square yard, 1,880,365 yards having been repaired at a cost of $227,443.03. Of cedar block pavements 2,595 square yards were repaired at a cost of $524.49, or 20.25 cts. per square yard.

An extended description of the methods of repair in Chicago, together with the cost for the year 1912, appeared in the August 6 issue of Municipal Journal.

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NOVEMBER 5, 1914.

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Compacting Foundations.

In a recent paper before an engineering society, from which we have quoted elsewhere, the statement is made that "no amount of compacting by roller or puddling can effectively settle such a fill (one over 2 feet deep of material other than sand or gravel) so that no further movement of the foundation is probable after the placing of the pavement." This statement we can not let pass without contradiction.

On the contrary, we would affirm that any fill except broken rock or gravel with insufficient fine material to make a dense mixture can be so compacted by rolling and puddling that there will be no further movement. That road fills are not ordinarily so compacted we admit; but we can point to numerous fills ten, twenty or more feet high which have never settled a particle. We refer especially to well-rolled reservoir embankments. If a fill is made of material which is carefully spread in six-inch layers, each layer thoroughly rolled by a heavy grooved roller (we prefer one drawn by four or six horses), rolling both longitudinally and diagonally, the material being kept at the right degree of moisture, a foundation may be obtained unyielding under any conditions except wheel loads greater than those safe for an earth foundation. We have built a high masonry wall partly on rock and partly on an earth foundation so compacted, without its showing any crack whatever where the two foundations come together.

As more directly applicable to road work, we would refer to a paper before the American Society of Municipal Improvement by George Warren, printed in our issue of October 30, 1913, wherein were cited instances of embankments which had settled, but also others which had not, and describing how the latter were constructed. In most of these cases a 12-ton flat wheel roller was used with satisfactory results. A solid base is always obtainable if the proper methods be employed, and at a reasonable cost; the only exception, we believe, being on swampy land, or when the material used is broken rock or gravel which has not a sufficient admixture of fine material to densely fill all interstices.

Pavement Defects.

Advocates of each of several different kinds of paving materials have recently been giving wide publicity to the fact that some one of the materials competing with theirs has been used in constructing pavements in which defects have appeared. But this is certainly no news. There never has been and probably never will be a road paving material which is fool-proof as to its use. Moreover, the treatment of the subgrade, including drainage and the foundation construction, are generally as important factors as the character of the surface in determining the duration of high efficiency and life of the surface.

This being the case, there would seem to be little point in stating that there have been failures or partial failures of pavements made of this, that or the other material. Of course there have! But such failures are not necessarily reflections on the material in question. A crack, for instance, shows on the surface only, but if we could see the foundation we might wonder that the pavement did not go all to pieces. And if the crack has remained only as such for a considerable length of time it may be the best possible commendation for the material—a poor material would have quickly disintegrated along the crack.

It is not by the poorest results but by the best that we should judge a material. Cement is judged by the tensile strength secured by expert manipulation; and if sand is used in the briquettes, it is a standard high grade sand. That a cement gave a low result when tested by a novice or mixed with the poorest kind of sand is no discredit to the cement, but to the tester or the sand. If the most important constituent of a road surface is poor, a good, durable road can not be made with it; but if it has been successful on one road it ought to be possible to repeat the success under similar conditions. The positive testimony of one good road is worth more than the negative testimony of several poor ones. Consequently, if the manufacturers of a given material can show one good durable road made of it, this is a more convincing argument for it than to cite a dozen poor roads on which their competitors' materials were used.

To the engineer or official who bears in mind the above facts (which he of course knows but may lose sight of), the only information conveyed by such flaunting of defects is that the material criticised is probably the most successful competitor of that in which the critic is interested is therefore worthy of consideration. Imitation may be the "sincerest flattery," but "knocking" is certainly a close second.

But this publishing of defects is not only a poor way of advertising—it is undermining confidence in the whole good roads proposition. An official or taxpayer who reads in rapid succession statements of failures of one after another of the more common road materials can not be blamed if he finally comes to the conclusion that none of them is to be relied on and that he had better stick to the

old-fashioned dirt road. If instead of saying "Other pavements are no good—try mine," advocates would refer only to the successes and merits of their materials, it would help the general cause of good roads, which is their cause, and would preserve to them the respect of the public and of their competitors instead of arousing the suspicion of the one and the hatred and retaliation of the other.

PENNSYLVANIA STATE HIGHWAYS

Department Embarrassed by Financial Difficulties—Repairs on Eleven Thousand Miles Since July Permitted by Automobile Licenses—State Laboratory

The present organization of the Pennsylvania State Highway Department was the result of the so-called Sproul Act passed by the legsilature in 1911, which placed 9,000 miles of highways throughout the Commonwealth under its jurisdiction. The first contracts were entered into on October 3, 1911, for about eleven miles of road. During 1912 contracts were let for more than 160 miles, a large part of the construction of which was carried into the year 1913.

The department hoped that a popular vote on the issuance of fifty million dollars of bonds for road construction would carry this spring and thus enable it to prepare a road construction program lasting for several years; but the constitutional amendment providing for this was defeated. Moreover, a considerable sum of money which was obtained from the licensing of automobiles, etc., and which was to have been used by the highway department in road maintenance was held up for months by the fiscal officers of the state, and was not released until July of this year, when the courts decided that it must be handed over to the department. Meantime, the legislature had made no appropriation for highway work, and the result was that very few contracts were let in 1913, and none in 1914, and that the work this year was practically confined to completing previous contracts up to the latter part of July, when the acquirement of a large sum from the automobile licenses permitted active work to begin on the road repair and maintenance.

From June 1, 1911, to June 1, 1914, the department had completed construction contracts on 881,764 feet of highways at a cost of $2,155,990, and at a total cost for engineering and inspection of $97,126. There still remain to be completed contracts for 139,815 feet, the contracts amounting to $629,746.

Since July the maintenance division has been working incessantly in an effort to transform roads which were all but impassable into highways which are in condition to maintain a serviceable condition and withstand the storms of winter. Eight thousand men have been engaged during this time in repairing more than 11,000 miles of highways. Rocks have been removed, gullys filled, ditches cleaned out, gutters opened, surfaces scraped, fresh top stone spread and rolled, berms dressed, bridges and guard fences inspected and repaired and unsightly signs (posted contrary to state law) have been removed, and the entire network of highways have been made passable by necessary repairs.

The amount received from automobile licenses will be of great assistance in future maintenance. Practically 180,000 registrations were made with the automobile division from the beginning of this year up to October 1, the amount collected totaling $1,165,675, which is nearly 50 per cent greater than in 1913, and nearly double that of 1912. It is now permissible under the state law to operate traction engines on the state highways weighing 26,000 pounds gross; but it was found necessary to refuse an application for a license for a traction engine weighing 46,000 pounds. These enormous weights are one of the conditions which add to the difficulty and cost of maintaining modern highways.

TESTING LABORATORY.

The Pennsylvania state legislature in 1913 made an appropriation for a laboratory for testing road materials to be operated by the state highway department, and E. M. Bigelow, highway commissioner, established the laboratory without delay and placed it under the direction of Thomas J. Keane, superintendent of asphaltic construction of the department.

In general the tests used in the laboratory are those recommended by the American Society for Testing Materials, and the most up-to-date machinery and equipment are used. Bricks are given the standard rattler test; samples of pavement are analyzed and the percentage of stone, asphalt and voids is ascertained. Complete records are kept of all tests made. The following brief description of the standard tests of asphalt and stone will be of interest to those who are not familiar with the methods employed.

Asphalt.—When a sample of asphalt is received it is heated to a liquid consistency of an electric hot plate; then a portion of it is molded for the ductility test, which is made on a three-gang ductility machine, which consists of a long soapstone tub filled with water maintained at a temperature of 77 deg. Fahr. The mold of asphalt is placed on the machine and by means of an electrically-driven apparatus is pulled apart beneath the surface of the water at the rate of five centimeters a minute. The ductility is ascertained by the length to which this specimen of asphalt may be pulled before breaking.

The test for penetration is next made. A pan containing asphalt is placed on a machine and a needle of standard size is adjusted so that the point just touches the surface of the asphalt in the pan. The asphalt is kept at a temperature of 77 deg. Fahr. while a 100-gram weight is applied on the needle for five seconds. The distance to which the needle has penetrated the asphalt is accurately measured in centimeters. For the next test the temperature of the asphalt is reduced to 32 deg. Fahr., at which point a 200 gram weight is brought to bear on the needle for one minute. The distance that the needle has penetrated is measured accurately and the penetration test is then completed. The machine used is a Dow penetrometer.

Samples of asphalt are then tested for solubility in naphtha, carbon bisulphide and carbon tetrachloride. Still another portion is poured into a flash point apparatus for the determination of the flash point or the temperature at which it will ignite.

Stone.—When a sample of stone is received it is placed under an eight-pound diamond drill which cuts out a specimen exactly one inch in diameter. This drilled specimen is taken to a combination diamond saw and lap where the stone is cut. A specimen one inch long is used for the toughness and one two inches long for the hardness test. After being cut these samples of stone are polished on the lap with emery and water.

The toughness test is made on a Page impact machine. The stone is put on an anvil resting under a spherical bearing block, the action of which is adjusted to approximate the hoofs of horses. On this bearing block a five-kilogram hammer falls one centimeter for the first blow and increases the distance which it falls by one centimeter for each successive blow. The number of blows required to break the stone constitutes the measure of toughness.

In the hardness test a standard mold of known weight holds the two-inch specimen. Standard quality of sand is fed into a revolving disk against which the surface of the stone is brought to bear. This disk makes 1,000 revolutions and the loss in weight which the sample undergoes determines by formula the hardness of the stone.

The cementing value is ascertained by taking 500 grams of stone, broken to pass through a 1½-inch screen, and placing them with 90 cubic centimeters of water in a ball mill in which two spherical balls about the size of billiard balls are rotated with the mixture as the mill revolves for 2½ hours. At the expiration of this time the stone is of a consistency of putty and a required amount is then weighed out to make a cylinder one inch in diameter and one inch high after compression in a machine under a pressure of 132 kilograms per square inch cross section. The cylinders then stand in air for twenty hours, at the expiration of which time they are placed in a water bath of 200 deg. Fahr. for

four hours. They are then placed in a cementation value machine fitted with a hammer weighing one kilogram and falling one centimeter every blow struck. A needle so adjusted as to make a mark on a piece of specially prepared paper affixed on a cylinder revolving in consonance with the machine makes a record of the effect of the blows upon the specimen. It is from this record that the cementation value is ascertained.

CRACKS IN CONCRETE ROADS

Greater Expansion From Moisture Than From Heat—Amount Varies With Density—Conditions Affecting Cracks—Reinforcing—Dished Sub-Grade

In view of the importance of the fact that cracking of concrete roads is generally considered to be one of the most serious objections to them and the most difficult to avoid, it seems to us that sufficient attention has not been given by engineers and road builders generally to the report of the committee of the National Conference on Concrete Road Building concerning the contraction and expansion of concrete roads, based largely on investigations made by the U. S. Bureau of Standards.

One of the most important features of this report, as well as that which undoubtedly seemed the most novel to many, was the statement and apparent proof that not only does concrete expand with the absorption of moisture and contract as it dries out, but that this effect of moisture is very much greater than the effect of temperature changes and may be sufficient to cause a stress in the concrete opposite to that which would be caused by a normal temperature change. Moreover, this effect of moisture absorption and drying out apparently continues throughout the life of the concrete. It would seem to follow, therefore, states the committee, "that the condition that would provide for a decrease in moisture content when the temperature increases and an increase in the mosture content when the temperature decreases would be an ideal one."

The experiments made also indicate that variation in the quality of the concrete will cause a variation in the tendency to expand and contract with change in moisture content, as dense mixtures absorb moisture less rapidly than porous ones. Consequently, if there are two qualities of concrete in a road existing either as a top and bottom layer or in two masses (such as two successive batches of slightly different mixture) occurring side by side, the more porous of the two would have a tendency to expand more than the other and consequently move a greater distance, resulting in tensile stresses and possibly in shearing between the two masses of concrete. If the base of a two-course pavement is more porous than the top, the tendency would be for the former to expand and contract more than the latter and thus cause a separation of the two.

The above is the strongest possible argument for securing absolute uniformity in both proportioning and mixing, in order that not only all of the contents of any one batch but also all the batches in a given pavement, shall be as nearly as possible absolutely uniform in composition and homogeneous in structure. How far this is from realization in too many concrete roads is known by many engineers who have given the subject attention.

Another point suggested by this effect of moisture on concrete pavements is the desirability of draining the subgrade. In a number of cases concrete paving has been adopted for certain stretches of road, because they were too soft and moist for macadam construction, and the assumption is made that dampness under a concrete pavement does not injure it in any way. If the soil and the pavement are kept uniformly damp all the time, this would probably be true, assuming that the dampness has no other effect. The committee, however, calls attention to the probable effects of frost in the subgrade, due to the expansion of the soil when the moisture in it freezes. If the subgrade is dry, there will, of course, be no such freezing and consequent expansion. On the other hand, if the soil be wet and the temperature falls sufficciently low, there will be freezing and expansion. If this freezing and expansion are uniform across the entire width of the road, and if the frost likewise leaves the ground uniformly throughout the width, thus allowing the pavement to settle uniformly, there may be no objectionable results. The committee remarked, however, that it is reported that cracks in concrete usually appear during a thaw rather than during a frost, and that this may be explained by the fact that the heat may be transmitted more rapidly through the shoulders than through the center of the road, thus causing the sides of the paving to settle more rapidly than the center. On the other hand, it seems probable that the action of frost will occur sooner and be more considerable along the edges than in the center. The result of this double action would be the raising of the edges of the road during freezing, thus causing a longitudinal medial crack on the underside of the pavement which would not show, followed by the opening of the pavement above this crack on its top surface as, during the subsequent thaw, the shoulders settle more rapidly than the centre. This explanation would account for the frequent occurrence of long cracks down through the center of concrete pavements and also of many other kinds of pavements which are laid on concrete foundations. If this explanation is correct, the drainage of the subgrade of concrete and concrete-foundation roads would appear as essential as in the case of the various kinds of macadams.

The committee, in view of their investigations, advises that the best mixture is that which is most dense, that the concrete should be mixed and placed in such a way as to produce a product of uniform quality; that the subbase should always be thoroughly wet before the concrete is placed to prevent rapid drying out, and that the concrete should be kept moist until it is strong enough to resist the stresses which will be caused by contraction due to drying out.

As to the effect of length of slab upon transverse cracks, the committee gives 25 feet as the maximum length for slabs in localities where there is little rainfall, while in localities where the rainfall is intermittent and the ground water rises in cool seasons and lowers in warm seasons the length may vary from 30 feet to a continuous slab. The length of slab should vary with the quality of the concrete, since the denser concrete will absorb less moisture and consequently have less tendency to move. The length should also vary with the condition of the subgrade. If smooth on a steep grade, the slab should be made shorter to avoid the tendency to slide down hill. Where there is any decided change along the length of the road in conditions of smoothness of subgrade, a joint should be placed at the point where this change occurs.

The thickness of the slab also may be considered in determining the length, since the greater the thickness the greater the strength of a horizontal foot of cross-section, and this increase is greater than the increase in resistance to motion due to friction between the concrete and the subgrade.

Experiments indicate that there is greater movement in a concrete pavement or concrete base covered with a bituminous carpet than in that uncovered, the reason for which probably is that a dark surface absorbs more

sun heat and also that the bituminous coating causes the concrete to retain for a longer period any moisture which gets beneath and into it.

The committee does not believe that the width of slab affects transverse cracking.

It favors a dished subgrade under all climatic conditions as being best able to resist tendencies to longitudinal cracks.

As to reinforcement, it recommends this when foundations are uncertain; in regions where there is little rainfall and long or wide slabs are desired, or where there is insufficient water for curing; when it is necessary to have a thin slab; when a decided change in grade occurs; when the movement of the concrete is restrained, as at street intersections or on curves, if joints cannot be placed properly; when the width of the slab is greater than 25 feet; or when it is necessary to crown the subgrade and the slab cannot be made thicker at the crown than at the sides. Fabricated steel should be used in that form which will give the greatest distribution. Where the reinforcement should be placed depends upon what conditions seem to demand it, it being placed nearer to that surface which will be placed under tension by such conditions. When used to resist stresses due to temperature and moisture changes, it should be placed near the bottom. Ordinarily, it is unnecessary to provide for temperature stresses, which are insignificant compared to those of moisture.

Where a road is constructed without joints, with the idea that nature will provide the joints where most needed, the concrete will weaken for some distance on each side of the place where the crack occurs, which may result in a partial disintegration of the concrete. There is, of course, the additional objection that the cracks will be irregular in line and more objectionable in appearance than with a straight joint. The thinner a joint the better, since stresses caused by expansion are readily absorbed by the concrete, and the less the actual expansion permitted the less will be the movement from contraction and consequently the tensile stresses which produce cracking.

Uniformity in the subgrade is very important, this applying to both the compactness and the smoothness, since unequal compactness will allow unequal settlement and unequal smoothness will allow unequal motion in different parts of the pavement, both of which will produce stresses unequally distributed and therefore more likely to produce cracks.

Among individual suggestions made in the discussion were the following: R. J. Wig, of the Bureau of Standards, chairman of the committee, believes that joints should be constructed as contraction joints, providing little or no room for expansion.

W. A. McIntyre emphasized the necessity of making the joint perpendicular to the surface of the pavement, because of the tendency otherwise for one slab to lift up onto the other when expansion occurs.

The Committee on Joints reported that "expansion joints should be kept filled to the level of the pavement surface so that there will not result an impact when wheels cross the joint. If the joint is not kept filled, grit will accumulate and in time the joint will be filled with non-elastic material. Even a joint which has been kept filled will in time become jammed with grit."

This point was also referred to by H. D. Kerr, who said that when the elastic material has squeezed out in hot weather or been worn away, the joints should be cleaned out and refilled; one reason for this being to prevent the penetration of water through the joint to the sub-grade.

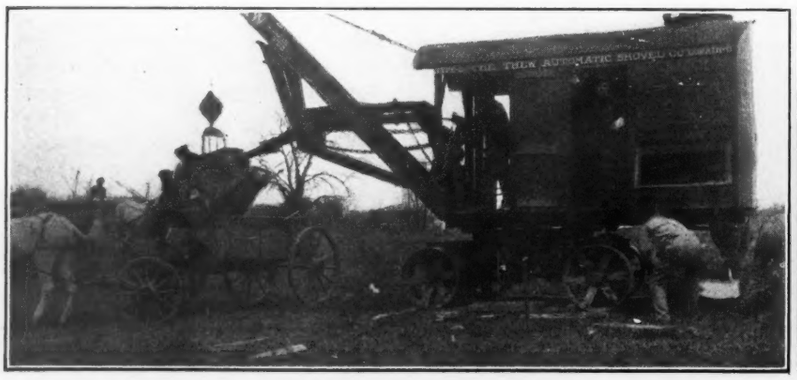
SHALLOW CUTTING IN ROAD WORK

Fourteen-Inch Cut Excavated by Steam Shovel for Gravel Macadam Road—Details of Operation and Itemized Cost

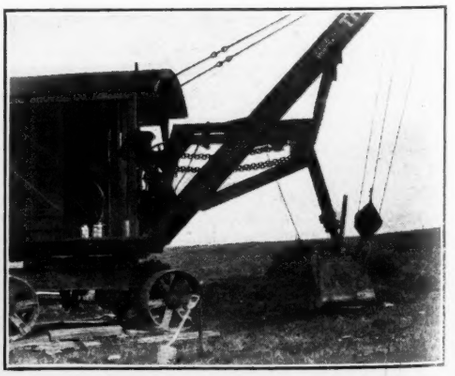
At Maybrook, N. Y., where are located the extensive freight yards of the Central New England R. R., the railroad experienced considerable trouble in keeping clear the grade crossing of the highway over the fifteen or more tracks. This was a source of considerable expense to the railroad, as the crossing was located almost exactly at the "hump" where many freight trains are made up every day. Finally, the railroad, which owned much of the surrounding land, had the crossing closed. The people in the nearby towns complained to the Public Service Commission, which ordered the railroad company to construct an overhead crossing, giving them, however, the option of improving the so-called "Barren Road," which runs parallel to the railroad for about four miles and crosses it beyond the yards. This option was taken advantage of by the railroad company, and the contract for improving this strip of road was let to the Schunnemunk Construction Company, of Highland Mills, N. Y., for about $27,000.

The road is to be a class B road of the New York State Highway specifications. The lower course will be 6 inches of ordinary field stone, well rolled, and the top coat will be composed of 3 inches of gravel, also thoroughly rolled. The wearing coat will be 14 feet wide with shoulders 5 feet wide, giving a total width of 24 feet of finished surface. Both box and pipe style culverts will be used. The former will be of reinforced concrete, 2 feet square, and the latter of 12-inch reinforced concrete pipe.

With the exception of two short strips, the new construction followed the old road for the entire distance,

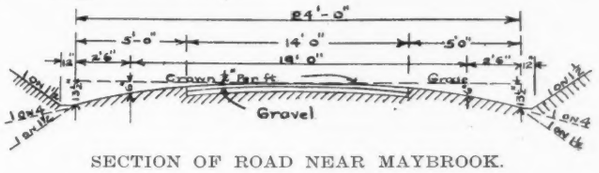


SHOVEL REVOLVED AND DISCHARGING INTO WAGON.



WORKING IN VERY SHALLOW CUT.

the only changes being in width and grade. This necessitated many cuts and fills, most of which were very light. The heaviest cut on the road was 8 feet 6 inches, but the majority ranged from 12 to 30 inches in depth. For this work a Thew type "O" steam shovel was used and demonstrated its superiority over hand labor in cuts as shallow as 10 inches. In work of this kind much depends on the engineer, and the Schunnemunk Construction Company had an exceptionally good man, Bert Scott, in charge of the shovel.



SECTION OF ROAD NEAR MAYBROOK.

During the presence of the writer work was being done in a cut 8 inches deep on one side and 20 inches on the other, an average cut of 14 inches. The shovel filled one 1½-yard Watson wagon per minute, averaging four buckets to the wagonload, the bucket being of ⅝-yard full capacity. The wagon made the trip to the fill, dumped and returned in two minutes, the fill being 150 feet away. In this way three wagons took care of the material from the shovel.

Every five minutes, on an average, the shovel had to be moved ahead, and, owing to the inexperience of the helpers in placing the plank, leveling the road, etc., the operation usually took an entire minute for the 5-foot advance. Allowing that the 1½-yard wagons were not entirely filled and that they averaged only 1 yard each, a very low estimate, the hauling was therefore at the rate of 50 cubic yards per hour. Assuming a loss from various causes of ten minutes out of every hour, the hourly haul would be about 42 yards, or at the rate of 420 yards per day. The foreman states that the excavation, week in and week out, will run from 40 to 45 yards.

The cost is approximately:

Engineer and fireman (per day)	$ 7.50
2 helpers	3.50
3 teams and wagons	15.00
Coal and oil	1.50
Wear and tear on machine	6.00
	$33.50

The cost per yard for 420 yards a day is therefore approximately 8 cents.

The two helpers at the shovel keep loose stones out of the track, smooth the earth and lay planks to form a track for the machine. The planks used for this purpose are from 4 feet to 5 feet long, 2 and 3 inches thick and from 6 inches to 10 inches wide. Usually two are placed under each wheel, but no particular precaution is observed toward breaking joints. The machine propels itself and is steered by hand, by means of a crank between the front wheels. Provision is made for coupling and steering by steam, but this is rarely done except on long trips.

When the machine has first been moved ahead and when, consequently, the shovel can obtain a full load more easily, one dip only is required to fill the bucket. But as the shovel has to reach farther away to get the earth, often as many as three and occasionally four dips are required to fill the bucket. In the latter case most of the earth scooped up remains in the front end of the bucket and would fall out or interfere if a second dip were attempted. In order to prevent this, the operator raises the bucket a short distance, draws it back slightly and then suddenly pushes it ahead about 6 inches, the resulting jerk throwing the earth into the rear of the bucket. This operation is accomplished more readily because of the slight slack in the chain operating the bucket, which makes the jar more effective. The whole operation of "jarring" is completed in a very few seconds.

At the other end of the fill, under approximately the same conditions, wagons were being loaded by hand. Here 6 men loaded a 1½-yard wagon in 12 minutes. The time for dumping and returning was the same as for the shovel. The time then for loading, dumping and returning was 14 minutes. This was at the rate of about 6.5 yards per hour, not allowing for any lost time, or 65 yards per day. The cost was:

6 shovelers	$10.50
1 wagon	5.00
Foreman, ½ time	1.50
	$16.50

The cost per yard for 65 yards, about 25 cents.

No foreman was needed at the shovel. One foreman was in charge at the dump and another divided his time between the gang filling the wagons by hand and a gang on the grading.

The road is being built under the supervision of Charles E. Smith, county engineer. William Holden is superintendent in charge of the work for the contractors. Work was started about October 26, and, with good weather, the contractor expects to finish by January 1. At present only 34 men are employed on the work, but this number will be increased in a short time, when the surfacing gangs are put at work to give the final shape to the sub-base.

REINFORCING PAVEMENT FOUNDATIONS.

Extract from paper by C. D. FRANCE, before the Indiana Engineering Society.

The determination of the use of reinforcement in concrete pavement will depend upon the type of foundation and width of pavement. Reinforcement may be used in either single or two-course work, and is particularly designed to care for slight settlement of fills, and to guard against contraction cracks developing where the pavement is wide. In any road where a new fill of over 2 feet is made, and the material used is other than sand or gravel, the pavement should be reinforced, no matter what the width of the road. No amount of compacting by roller or puddling can effectively settle such a fill, so that no further movement of the foundation is probable after the placing of the pavement.

The type of reinforcement which is most economical in price and handling is wire fabric. The weight of material to use in this fabric has been the subject of much discussion and, although it may be well sometimes to consider each specific case, in general it may be said that reinforcing metal running parallel to the centre line of the pavement should have a cross-sectional area of 0.038 inches per foot of pavement width, and a cross-sectional area perpendicular to the centre line of the pavement of at least 0.049 inches per foot of pavement length. Reinforcing has been advocated in two-course work where it is spread upon the still plastic base, which, being slightly undulating, insures that no line of cleavage can possibly develop between the two courses, and, in addition, imparts greater strength and security to the pavement. In single-course work, reinforcing is placed about 3 inches from the surface.

REPAIRING MACADAM OPENINGS.

Openings in macadam pavements are a source of annoyance and offer a difficult problem because it is impractical to use a roller in repairing them, on account of the expense. The superintendent of streets of Chicago, Walter G. Leininger, reports that his department has obtained splendid results with the use of asphaltic and other bituminous binders, which enables them to secure, without the use of a roller, a repair better than the original pavement.

The WEEK'S NEWS

Lincoln Highway Anniversary—State Aid in Kentucky—Pittsburgh's New Bridges—Mosquito Extermination in New Jersey—Water Supply of Illinois—New Lighting in Pueblo, Col., and Portland, Ore.—New Motor Fire Apparatus in Many Cities—Rapid Transit in Boston and New York—Cities Plan to Aid Unemployed—Control of Engineering in Pennsylvania.

ROADS AND PAVEMENTS

Lincoln Highway Celebration.

Detroit, Mich.—To fittingly celebrate the successful completion of a year of progress on October 31, the Lincoln Highway Association has decided upon a unique way of forming a blazing line of bonfires to mark the transcontinental trail from coast to coast, a distance of 3,400 miles. In addition to this celebrations were held in about 2,000 cities and towns along the route. Among these were: Newark, Trenton, Philadelphia, Lancaster, Chambersburg, Pittsburgh, Canton, Mansfield, Bucyrus, Lima, Fort Wayne, Elkhart, South Bend, Chicago Heights, DeKalb, Dixon, Clinton, Cedar Rapids, Omaha, Kearney, North Platte, Cheyenne, Evanston, Ogden, Salt Lake City, Ely, Reno, Carson City, Sacramento, Oakland and San Francisco. Vice-President Pardington, of the association, reports that the first year of the national highway has seen 2,700 of the 3,400 miles marked by signs for the guidance of tourists. By spring it is expected that the entire route will be marked with red, white and blue signs. There will be at least five markers to the mile and 17,000 will be needed to finish the work. In addition to marking the trail properly, many of the feeders also have been tagged.

State Aid in Kentucky.

Frankfort, Ky.—The first direct aid given by the State of Kentucky to the construction of highways since 1839, marking an epoch in road building in Kentucky, was given when Commissioner of Roads R. C. Terrell approved the contract and bond for the construction of 1½ miles of water-bound macadam in Lewis county, of which the state and county each will bear half the expense. Lewis county voted a bond issue of $150,000, being the first county to take such action, and as money is expended each year out of this fund under the act of 1914, the state will reimburse the county out of the road fund raised by the 5-cent tax until the county is reimbursed half the amount spent. The act of 1914, declaring approved highway routes connecting county seats to be public works, specifies that these shall be the first to receive state aid. Considerable work has been done in Lewis county since September 1, but it has been done with county equipment under the direct supervision of engineers from the Road Commissioner's office.

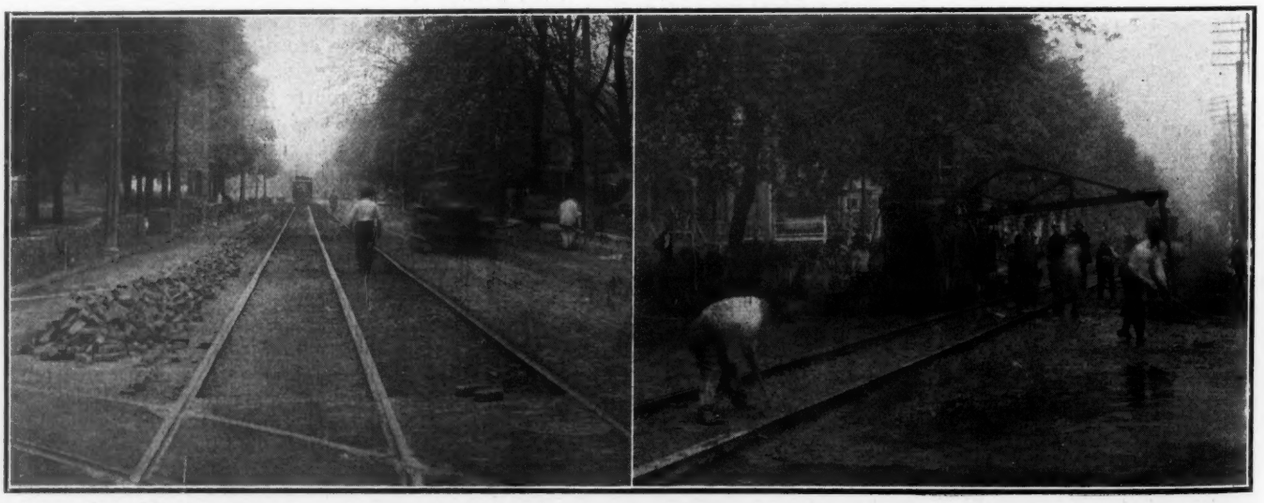
Suggests Improved Paving Methods.

Brooklyn, N. Y.—George W. Tillson, Consulting Engineer to Borough President Pounds of Brooklyn, has submitted a report of his study of streets and pavements in European cities, made last year. Mr. Tillson, in the early spring of 1913, was designated by the Mayor to attend the Third International Road Congress, which was held in London. At the same time he was directed by former Borough President Alfred E. Steers to visit some of the larger cities of Europe and to investigate and report upon street conditions in them. In general Mr. Tillson stated in his report that conditions of the pavements in European city streets is better than that of streets in America. Of the cities visited Berlin had the best pavements and they were kept in the best condition. Street car tracks and the pavement in the street car area are in better condition in Europe than in America. Practically the same materials are used for modern European pavements as in this country, but there is a feeling that the pavements, like all other construction in Europe, should be of a more durable and permanent character than is considered necessary in this country. The street car track areas are under the entire control of the city officials in almost every case, so that there is no red tape existing to prevent prompt repair and renewal when necessary.

Mr. Tillson suggested also that the funds for new pavements should be provided in advance, so that at least several months should intervene between the time when it was known that streets would be paved and the carrying out of the work, and an attempt should be made in each case to determine when the work was to be ordered and just when it should be carried out on each particular street.

Paving Work in Binghamton.

Binghamton, N. Y.—After a delay of three years part of the Main street pavement is to be repaired. The pavement has been going to pieces for several years, due, it is claimed, to the giving way of a sewer trench beneath the street car tracks. The last common council held it was the duty of the Binghamton Street Railway Company to repair the pavement at its own expense. The mayor and corporation counsel doubted the ability of the city to collect. This year the matter was compromised, the city and the railroad company sharing the cost. The pavement will be relaid, new rails placed and the concrete reinforced, the work



Courtesy Binghamton (N. Y.) Press.

WORK ON BINGHAMTON STREETS.

being done by the railroad company, the city to later reimburse the company.

A start is being made on the 1915 pavements. Council is discussing the construction of bitulithic pavement on Conklin avenue. For several years the property owners on this street have been anxious for a pavement. By getting an early start at this time it is thought the contract can be let in January when a low price can be obtained on the pavement and the work started as soon as the frost leaves the ground. As the city owns the frontage along the north side of the street and must pay three-quarters of the cost of the pavement it will be a large drain on the 1915 paving fund. The illustrations show the work on the Main street and also laying concrete on Robinson street.

Columbia River Scenic Highway.

Portland, Ore.—The bed of the great Columbia River auto highway is laid and bridges, culverts, stone banks, tunnels and viaducts have been constructed. After next spring's wet season is over the concrete surface will be laid, and traffic will be admitted by warm weather. Parts that have natural foundations are already in use. The highway proper begins up the Columbia 100 miles east of Portland, making the city its axis, thence continuing 110 miles to Astoria, at the mouth of the river. It follows one side of the great gorge, which the river cut through the Cascade Range, passing through a forest of gigantic fir trees. At Shepherd's Dell the altitude is 750 feet; at Thor's Heights on Horseshoe Bend, 900 feet, and at Wentworth's Falls, 1,000 feet. From high levels it often slopes downward for four or five miles to perhaps not more than 75 feet above water. Whether rising or falling the grade remains uniform at 5 per cent; the curves never of greater radius than 100 feet, and the width of the road constant at 24 feet, except in case of bridges and tunnels. Where slides are possible retaining walls were built of rock, without mortar or cement, as is done in Italy. The foundations are laid on solid rock. The longest stretch is below Oneonta Gorge, where the wall is 30 feet high. At Multnomah Falls the base of the highways runs near a railway, where the road runs over a concrete viaduct, so that any rock slides will run under it. All bridges are of concrete, to stand truck loads of 20 tons weight. So far $350,000 has been expended. The concrete surfacing next spring will require another $100,000.

Courtesy Pittsburgh (Pa.) Dispatch.
BAUM BOULEVARD BRIDGE IN PITTSBURGH.

Paving Company Wins Suit.

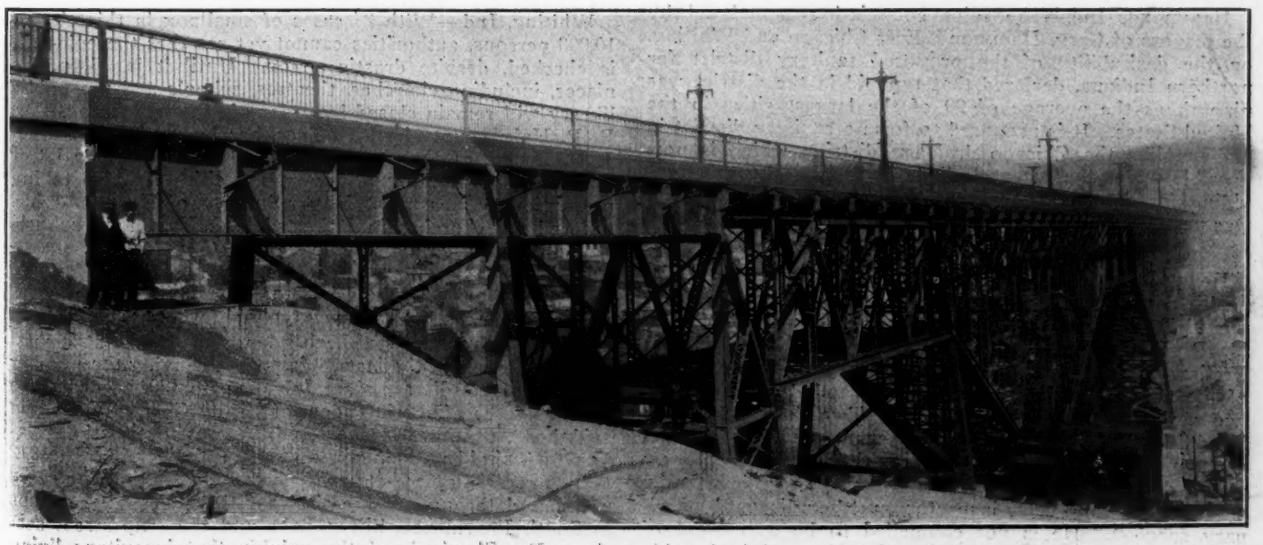
Reading, Pa.—The Pennsylvania Asphalt Paving Company obtained a verdict of $23,660 against the City of Reading, in a suit tried in the United States District Court. The suit was the outgrowth of a contract dated September 15, 1899, which was let to the paving company for paving with asphalt certain streets in Reading. According to the terms of the contract the company was to receive 70 per cent of the price agreed upon for the work at the time of its completion and the balance at the expiration of a certain length of time which the company guaranteed the work would last. When the guaranteed time expired the city of Reading refused to pay the 30 per cent on the ground that the work had not withstood the test required under the contract, and the suit followed.

New Pittsburgh Bridges.

Pittsburgh, Pa.—A new concrete bridge has just been completed and another is nearing completion. The new Bloomfield avenue bridge, which is illustrated here, spans the Pennsylvania railroad hollow from Liberty street to Grant Boulevard, a length of 1,740 feet. The contractors expect to have the structure open before winter sets in. The bridge is of steel construction on concrete piers. The concrete flooring has now been laid and this will be covered with a coating of asphalt. The other bridge shown is the Baum Boulevard bridge which has just been completed over a deep ravine. A somewhat novel feature of this bridge is that a building is to be constructed with its base in the ravine and its entrance flush with the bridge.

Work of Good Roads School.

Morgantown, W. Va.—The second good roads school in West Virginia will be held in Morgantown, December 1 to 11. State Highway Engineer A. D. Williams has outlined the program for the school. The school bids fair to be very popular. Among the lecturers will be Prof. A. H. Bianchard, of Columbia University; Secretary Blair, of



Courtesy Pittsburgh (Pa.) Dispatch.
BLOOMFIELD AVENUE BRIDGE READY FOR CONCRETE FLOORING.

the National Paving Brick Manufacturers' Association; C. M. Canady, of the American Bridge Co.; J. F. Richardson, of Buffalo; Arthur F. Kind, of Marion, O.; W. A. Cook, of Frankfort, N. Y.; J. H. Young, of Cincinnati; Philip Sharples, of New York City, a representative of the Office of Public Roads, Washington, D. C. Negotiations are now pending with representatives of other universities and state departments and well-known and successful contractors, and a large number of machine companies will have exhibits. One day will be devoted to the study of road machinery under the direction of the mechanical department, thus assisting the road officials in procuring the best quality of machinery by giving them an intelligent acquaintance under the supervision of competent men. One day will be devoted to the study and discussion of bridges and practically all of the phases of the road problems will be taken up. Many of our county and city engineers will be asked to take places on the program, and there will be open discussion of local problems. Instead of the law requiring just the engineers to attend, it may be so changed as to require the presidents of the county courts, so that counties not having engineers would be assured of the chance to participate and derive their share of the benefit.

SEWERAGE AND SANITATION

New Drainage Scheme for Mosquito Extermination.

Newark, N. J.—In the near future the Newark meadows will be dyked and ditched in every direction that the tidal flow can be controlled, and tides or heavy rains cannot interfere with the work of the Essex County Mosquito Extermination Commission. The plan is all set forth in the third annual report of the commission submitted to the director of the State Experiment Station at New Brunswick and to the Essex County Board of Freeholders. The survey of the meadows is practically completed and the meadows will be blocked off into sections of 500 square feet, with numbered stakes. The report shows that for the fiscal year beginning November 1, 1913, and ending October 31 of this year, the receipts were $75,369.12 and the expenditures $62,997.75, leaving a balance of $12,371.37. The dyking and flood gate proposition will be finished by spring. An experiment has already been made with the dyking system on 500 feet of the worst part of the new meadows and that ground is now dry. The report goes on to say that the commission believes the problem of mosquito control in this state is near solution. It calls attention to the joint work under consideration between Essex and Union County, which calls for the shutting off of all the section of meadow west of the Central Railroad embankment to Elizabeth, some 3,500 acres. This, according to the report, can be accomplished with tide gates.

Plan to Fight Typhoid.

Hammond, Ind.—The joint commissions appointed by the mayors of Gary, Hammond, East Chicago and Whiting, on the desirability of the proposed sanitary district for northern Indiana, declared that typhoid in the district was nine times the average of 20 of the largest cities in the United States. It is proposed to form a sanitary district in Indiana like the Chicago drainage district, which is now possible under the recent Indiana law. The situation providing for co-operation with the Chicago sanitary district was presented by Henry W. Lee, of Chicago.

Improve Health Department.

Newport News, Va.—The Council has reorganized the health department. It has created a health board consisting of Drs. G. J. Williams and Robert Davis and Messrs. M. R. Piland and Samuel Edwards and Health Officer Pretlow. In essential, the new department is to consist of the above board of health, a food and dairy inspector, two sanitary inspectors and a clerk. Two thousand dollars in addition to the sum now being spent on the health department was appropriated to defray the increased expenses of the department under the new plan. According to the plan, the food and dairy inspector must be a licensed veterinary surgeon. He is not compelled to be a resident of this city, the councilmen holding that they might be able at some time or other to secure an "outside" man more competent than a resident of Newport News. The food and dairy inspector also is to perform the city's veterinary work. Members of the board of health and the health officer are to be vested with almost complete authority, according to the plans adopted. However, they are held accountable to the council and must base their actions on rules, regulations and ordinances to be enacted by that body.

The health officer stated that the city has been spending $2,900 a year on its health department, exclusive of the cost of the removal of garbage. That sum, he said, is about one-fourth the amount spent by other cities of this size for the maintenance of their health departments. The food and dairy inspector is to receive a salary not to exceed $1,200 a year; the two sanitary inspectors to receive salaries not to exceed $1,000 and $900 a year, respectively, and the clerk to receive a salary of not more than $500 a year. A fee of $2 a meeting is to be paid the members of the board of health for each meeting they attend during the year up to twelve.

Low Typhoid Record in Virginia.

Richmond, Va.—Statistics just compiled by the State Board of Health for the year ending September 30, 1914, show that Virginia has had less typhoid during the past twelve months than during any year in the records of the board and only 52 per cent as many cases as during the year 1908-09, the first for which statistics are available. Only 4,012 cases were reported from October 1, 1913, to September 30, 1914, and the total number estimated for the same period was 7,460. In 1908-09, the first year following the reorganization of the state's health forces, 7,442 cases were reported, 14,398 were estimated for the state. In 1909-10, these figures decreased to 6,771 and 11,843, respectively. In 1910-11, reported cases were 5,959 and estimated cases 11,803. For 1911-12, 4,608 cases were reported and 8,470 estimated. Aside from this widespread interest and co-operation in improving sanitary conditions, the late spring of 1914 undoubtedly helped reduce the morbidity from typhoid. In the same way, the use of typhoid vaccine in families where the disease appeared and among those who had been exposed to it has played a considerable part in limiting the ravages of the disease. The fact that only two outbreaks of consequence were reported during the past year is typical of the changed conditions and of the general precautions now being taken.

Cause of Lehigh Typhoid.

South Bethlehem, Pa.—Dr. Samuel G. Dixon, State Commissioner of Health, has notified the Lehigh University authorities that the cause of typhoid among the half hundred students was due to a "human carrier" in the person of a colored waiter, whom the college commons employed in September.

Epidemic of Smallpox.

Whiting, Ind.—With 25 cases of smallpox in this city of 10,000 persons, authorities cannot yet see that the epidemic is checked, despite drastic action. Until it is, all public places, including churches, theatres, schools and the public library will remain closed by order of Mayor Schrage. Dr. R. P. Hale, county health officer, has been advised by Dr. J. N. Hurty, of the state board of health, that the latter may come to Whiting. Surrounding cities are also taking precautionary measures. Mayor Smalley, of Hammond, has ordered the churches in Robertsdale, a Hammond suburb, adjoining Whiting, closed for a time.

Typhoid in Providence.

Providence, R. I.—Two new typhoid fever cases have been reported to the municipal health department, making a total of 37 new cases in the last 28 days and bringing the number of cases of the disease since July 1 up to 120, according to official figures. Superintendent of Health Charles V. Chapin said, however, that he considered the present situation relative to typhoid as being in no way an epidemic. In 1912 there were 128 cases between July 1 and Nov. 1. The cases are spread throughout the city, but there are large groups in South Providence, Silver Lake and the Ship street section. Dr. Chapin is of the opinion that insanitary living conditions are responsible for many of the cases.

WATER SUPPLY

To Meter All Water.

Chester, Pa.—The New Chester Water Company has found it necessary to conserve the water supply of the city and to comply with the requirements of the State Act of Assembly of 1913, to meter all consumers in this city and the district furnished by this company, according to a statement made by Superintendent William B. Chadwick. This means a large outlay of money on the part of the water company, but it will mean much saving of water. At the rate water is being wasted over the property of the company it will be but a short time before the corporation will be required to enlarge the filtration plant and the supply source of the present plant, unless something is done to check the great waste which occurs every year. The amount given out as wasted is 1,800,000 to 2,000,000 gallons per day. All meters will be furnished and installed by the company, and any owner using water on a flat rate has the right to be supplied by meter at the present meter rates.

Bidders Offer to Buy Bonds.

Sacramento, Cal.—During the winter it may be possible to have construction work in progress upon the $1,329,000 new annexed district and high-pressure water system in Sacramento, for which bonds have been voted, according to the announcement of City Commissioner of Finance F. E. Shaw. About $33,000 worth of the bonds already have ben sold. The United States Cast Iron Pipe Company, which is one of the largest pipe manufacturing concerns in the country, has informed a Shaw representative that it is anxious to take over the entire job and will market the bonds if it can do all the work. As a result of the offer it is probable that the commission will call for bids upon the entire job with the understanding that the firm which gets the contract must place the bonds upon the market. Dr. Shaw points out that if the big pipe job were in progress during the winter it would help relieve any unemployed problem Sacramento might have.

Water Supply in Illinois.

Springfield, Ill.—The first fall bulletin from the office of State Fire Marshal W. H. Bennett has been issued. Marshal Bennett declares that during the past six months many cities in central and southern Illinois have been placed in a serious position by the lack of an adequate water supply. This is partially due to the fact that the season has been an especially dry one, and in most sections of the state the rainfall during the summer months was remarkably light. Another reason is that the cities are constantly growing in size and increased water supply is constantly demanded. The real reason, he says, however, lies in the fact that the ponds and lakes throughout the state have been drained away and there is now no supply of water to replenish the underground reservoirs. Those inland cities in Illinois which have to depend upon a system of wells for their water supply will undoubtedly, in a few years, have to resort to some other means to supply an adequate amount of water to meet the demands of an increasing population.

During the past few months there have been a number of very serious fires in this state, causing almost the entire destruction of the business sections of those cities in which the fires occurred.

The state fire marshal department prepared a little book on fire waste and methods of fire prevention for use in the schools of this state. Thirty thousand of these books were distributed to the teachers throughout the state. The state fire marshal department has had printed a supply of inspection blanks for use of school pupils in the cities of the state. These blanks are supplied to the teachers of the schools, usually by the chief of the fire department of the city. On these blanks are a number of questions relative to fire conditions and fire hazards and the pupil takes the blank into his home where it is properly filled out and returned to the teacher, who later on delivers them to the chief of the fire department. Through these inspection reports the chief is often brought in touch with minor defects in homes of the city, which otherwise might escape his attention, and many other defects are brought to light which are immediately removed by the owner or occupant of the building.

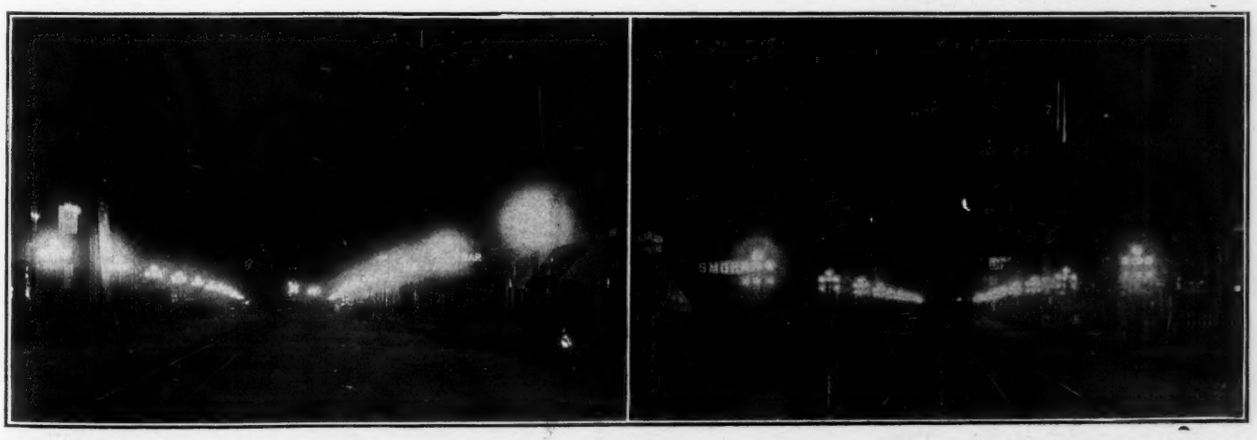
STREET LIGHTING AND POWER

Open New White Ways.

Pueblo, Colo.—Within a few days two new white ways have been opened. There are now three streets illuminated and when one more is added the entire business section will be lit. All of the money for the purchase and installation of the Corinthian decorative posts was subscribed by the property owners of the districts included, while all of the posts and materials, with the single exception of the incandescent globes themselves, were manufactured in Pueblo, instead of in the east as has been the case heretofore. The new lighting districts, as well as the Main street district, completed more than a year ago, are a direct result of the co-operation of the property owners of the district with the traction company and the city officials. The current required for their maintenance costs the city but slightly more than that used by the flaming arcs which had been in use previously. The engineer of the Pueblo Foundry and Machine Company submitted designs for the Corinthian posts which since have been adopted as the official standard for the city of Pueblo. The big contracts went to the local concern.

To Improve Lighting.

Chattanooga, Tenn.—Under the contract the city has for lighting the streets of Chattanooga, which will become effective Dec. 9, all the old series arc lights will be discarded and replaced with the high candlepower mazdas. The city will receive 50 per cent more lights under the new contract than was had under the old, and at a much less cost, it is claimed. At present, Chattanooga has 593 street lights which cost approximately $2,300 a month. Under the new



Courtesy Pueblo (Colo.) Star-Journal.

PUEBLO'S TWO WHITE WAYS.

contract it will be able to have at least 900 lights at an estimated cost of $17,000 a year. It is the purpose of Commissioner Warner, of the department of public utilities, grounds and buildings to discard the 380 series arc lights now in use. They will be replaced by the latest improved nitrogen-filled mazdas, which can be had at an average cost of $26.50. The series arcs now in use cost $70.08 a year. It is his purpose, he says, to have the 250-candlepower lights installed at corners, with lesser candlepower lights midway the blocks on the streets darkened by shade trees.

New Lighting System Completed.

Portland, Ore.—Superintendent Nicholson has announced that the new lighting system has been opened. After several nights of testing a few minor repairs were all that was necessary and the lights are now burning continuously. Portland was one of the first cities in the country to make a complete installation of the new nitrogen lamps.

Town Gets Low Rate.

Lynnfield, Mass.—The town of Lynnfield is now to have what is said to be probably the cheapest electricity in the state, as the result of a decision just handed down by the state gas and electric commission, allowing it to buy current from the municipal plant in Reading at four cents per kilowatt hour.

To Install New Lights.

Memphis, Tex.—The materials which will go into the construction of the new lighting system for this place, has arrived and work will commence at once. The insufficient arc lights now in use will be replaced by the modern 100-watt tungsten lamps, with new posts, and the number will also be increased.

Holyoke's Wires Underground.

Holyoke, Mass.—Constructed at a total cost of $125,000 in order to remove the wires from the street and enable the municipal electric light and power plant to furnish its currents without having recourse to overhead wires in the congested section of the city, Holyoke's new underground system of electric wires is now in working order. This work has been going on practically for a year and a half. The entire cost has been paid for out of the earnings of the department. Following are the chief items in the cost of this work, the figures given being approximate: 86,000 feet of conduits, $73,500; 100,000 feet of cable, $30,000; connecting up the underground wires with those of customers and taking down the old wires, $20,000. Contractor P. J. Kennedy, of Holyoke, built the conduits and the American Steel & Wire Company furnished the cable. The conduits contain the wires for arc, primary and secondary circuits. There are 65 lights in this ornamental street light system.

Cleveland Lighting Plant Profitable.

Cleveland, O.—F. W. Ballard, city light superintendent, announces that the municipal lighting plant, opened in July, 1914, showed a profit in August and September, 1914. Reports just compiled by Ballard show that in August the new plant earned $471.25 and in September $1,689.65 over and above all expenditures. On the basis of business now enjoyed by the municipal plant and that contracted for, Ballard places the profits of the first year at $100,000, minus interest, depreciation and taxes. As the business grows there will be charged against the plant's operation a depreciation fund of 3 per cent of its actual valuation and a 1½ per cent charge for taxes. No taxes actually will be paid, however, and this fund, with the depreciation fund, will be put back into the plant. These two funds, Ballard estimates, together with $400,000 cash on hand and $500,000 bonds authorized, but not sold, will pay for all extensions needed to bring the plant to its full capacity. Then it will bring in, he says, from $1,000,000 to $1,125,000 a year, with an actual net surplus or profit of $500,000 annually.

Companys' Rates Sustained.

Springfield, Ill.—Without saying whether or not the rate is reasonable, but declaring that it is not discriminatory and shall remain in force and effect until such a time as a new rate, based on a physical examination of that property is concerned, is made, the State Utilities Commission entered an order allowing the Springfield Utilities Company to put into effect the rates of December 1, 1913. The commission found that 75 per cent of the consumers are benefited or not affected by the new schedule, and that the rate is an increase only for 25 per cent of the consumers of electrical current. The commission finds that users of electricity for residence, commercial, sign and show window lighting, rectifier (battery charging), photo shows, 500-volt d. c. and single-phase power receive new rates equal to or better than the old rate, and that these classes in number equal approximately 95 per cent of all users connected, the other 5 per cent being represented as users of 220-volt d. c. and three-phase a. c. power who have previously received very discriminatory rates.

FIRE AND POLICE

Whole Police Force Insured.

Philadelphia, Pa.—What insurance men say is the largest life insurance policy ever written has been issued by a Hartford, Conn., company for $8,000,000, insuring the entire police department of Philadelphia.

$400,000 Fire in Hagerstown, Md.

Hagerstown, Md.—This city has been visited by one of the worst fires in its history, causing an estimated loss of more than $400,000. An hotel and a garage containing 75 automobiles were burnt.

Montana Police Organize.

Helena, Mont.—The Montana Police Protective Association has been effected at a recent conference, the purpose of which is to advance the legislative interests of the members of police departments throughout the state. The first act was to endorse the police pension fund law of the state of Washington. It was decided to make an effort to get this law on the Montana statutes by introducing such a measure at the coming session of the legislature. Chief of Detectives Ambrose, of Butte, was elected president of the newly created association; F. W. Gardner, of Helena, vice-president; Al Helgoe, of Billings, secretary; Thomas J. Wilson, of Butte, treasurer; Fred Gebhardt, of Helena, and S. F. Smith, of Butte, trustees. Represented by delegates at the conference were the police departments of Butte, Helena, Great Falls, Billings, Missoula and Livingston. The principal provisions of the Washington law, for which the association will work, are:

Retirement at the age of 60 years on half salary. Retirement on physical disability or incapacitation during performance of duty on half pay. Restoration to force when such disability or incapitation ceases. In case of death during the period of incapacitation or disability, heirs have no claim. Pension to widow of one-third of salary at death. If there is no widow, children under 16 years of age draw pensions, which ceases when widow or children marry. In order to be entitled to the benefits of the law, a member of the police force must have worked as an officer for five years. The disbursement of the fund will be in the jurisdiction of a committee in each city, consisting of the Mayor, City Clerk, City Treasurer and three patrolmen appointed by the members of the various departments.

MOTOR VEHICLES

New Service Truck Installed.

Waterloo, Ia.—The new motor service fire truck has been installed at the Central fire station. The truck was made by the American-La France Co., of Elmira, N. Y., and is equipped with about 250 feet of ladders. It has Dayton airless tires and has an engine of 100 horsepower. The machine is the latest model service truck. The fire department has been handicapped by the lack of ladders for use at fires in the residence district, but the new truck will relieve that condition.

New Triple Combination in Commission.

Lynchburg, Va.—The new triple combination motor-drawn fire engine, which is to be installed in the new fire station to be known as No. 6, has been received. The engine was constructed by the American-La France Company, of Elmira, N. Y., and it has a capacity of 750 gallons of water a minute. The apparatus carries a forty-gallon chemical apparatus, as well as hand chemical tubes. The equipment includes 1,200 feet of hose, two scaling ladders, one roof ladder, a 20-foot extension ladder, axes, crow bars and apparatus needed by the firemen in their work.

Motorized Chemical Received.

Newton, N. J.—The new chemical automobile truck, which was converted from a horse-drawn apparatus by a Scranton, Pa., company, has been delivered to the town officials. The car, after severe trials, was accepted.

New Chemical in Commission.

Highland, N. Y.—The new chemical engine, which the town recently purchased, has arrived. It was made by the American-La France Company, of Elmira, N. Y., and is of the latest design.

New Fire Auto Engine Tested.

Middletown, N. Y.—The new Seagrave chemical and pumping engine received by the Wallkill Fire Company was tested in the presence of Commissioner of Public Safety Degnan, Commissioner of Public Works Hollenbeck and many out-of-town fire officials. The tests were under the supervision of Foreman Shindler assisted by Acting Chief Wm. Simpson and Second Assistant Chief Schoonmaker, of the company. The engine was tested at 120 pounds pressure with two 100-feet lines of 2½-inch hose for 25 minutes. In a second test a stream was thrown through 600 feet of hose under 200 pounds pressure. The machine and the second test are down in the illustration.

RAPID TRANSIT

Want State Ownership of Transit.

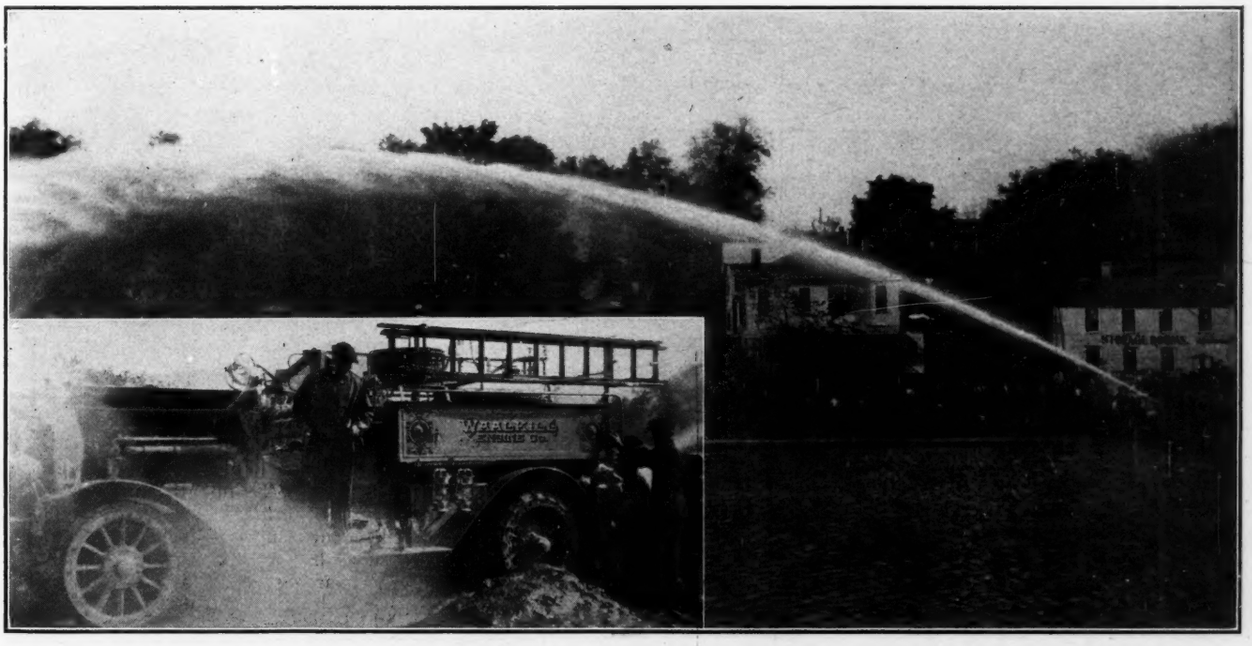
Boston, Mass.—The Massachusetts Public Service Commission, instructed by the legislature to study the problem of transportation facilities for the Metropolitan district, has begun hearings. At the first hearing all the railroads entering Boston were represented by counsel and operating officials and all the street railway companies operating in the Metropolitan district were represented. The general public was represented by city officials from Boston and most of the surrounding cities, and by the members of the official planning boards within the district. Such thorough preparations have been made for this series of hearings, by the commission sending several communications to the various cities and towns involved and assigning its own experts to make preliminary studies, that it promises actual information. This new investigation is the direct result of President Sullivan's proposition last year that his company, the Bay State Street Railway Company, should be consolidated with the Boston Elevated Railway Company, and one large company formed to operate the transportation lines within Greater Boston.

Starting with Boston the commission will try to find out what each city and town really wants in the matter of better street railway service and connections with Boston. The City of Boston Planning Board presented a report and a map giving the outlines of what it has decided upon as the proper solution. It treats it from three viewpoints—physical, corporate and financial, and makes the proposition that the Commonwealth should take the transportation lines in the Metropolitan district and readjust them, develop them and operate them, or lease them. The plan presupposes and is conditioned upon the electrification of all passenger lines entering Boston. For the accomplishment of this, providing for adequate capital and proper control, the planning board suggests state ownership of the service within the Metropolitan district, making the following specific recommendations:

1. That ownership of all transportation facilities within the approximate limits of the metropolitan district be taken over by the Commonwealth.
2. That these facilities be operated as a unit by either of two methods as the voters may determine:
(a) By the Commonwealth, through a general manager appointed by the Public Service Commission.
(b) By a private company, which should lease the facilities from the Commonwealth.
3. That the proposed Boston avenue and Wead tunnel be constructed and that the railroads on opposite sides of the city be connected by tunnel under Boston avenue, with the object of carrying all suburban passengers to stations within easy walking distance of their destinations.
4. That the railroads be electrified and that the Boston & Albany Railroad tracks be covered over for a teaming boulevard from the Cove Street Bridge to Commonwealth avenue.

Begin New River Tunnels.

New York, N. Y.—Ground was broken by Mayor Mitchel, and work has commenced on the new $12,500,000 Brooklyn Rapid Transit tunnel to Montague street. The first bit of earth was turned by Chairman Edward E. McCall of the Public Service Commission. Mayor Mitchell, in the address of the day, characterized this new work as the greatest ever attempted by a municipality. George H. Flinn of the Flinn-O'Rourke Engineering Company, the contractors, said the work would positively be completed in one year less than the time called for in the contract, which is 42 months. The tunnels are to be bored through strata of rock, fine sand and clay which constitute the river bottom, as shown by the profile maps of the tubes prepared by the Public Service Commission, one of which is shown here. One of them, the tunnel from Whitehall street, Manhattan, to Montague street, will dive through the solid rock, about 1,600 feet out from the Manhattan shore. The shield method is to be used in the construction work; each tunnel to consist of two shield-driven, single-track, cast-



Courtesy, Breese—Middletown (N. Y.) Times-Press.
TESTING MIDDLETOWN'S NEW FIRE FIGHTER.

iron-lined tubes constructed under compressed air. In addition to the tunnels proper the Flinn-O'Rourke Company, the engineering contractors who have the job, must erect permanent ventilating shafts on each side of the river and a station on the Clark street tube. All the tunneling below water level will be done under compressed air.

One of the interesting features of the work will be a telephone system to be placed in the tube as it is constructed, by means of which communication will always be maintained from each heading to the power house and to the office on shore of the engineering corps. In this way it is hoped to minimize the accidents by means of the immediate communication possible. As shown in the cuts, it has been found necessary to make the tunnels on a steep grade, 3.8 for one tunnel street and 3, in some places, on the other.

When all the tunneling is completed there will be ten under-river rapid transit tunnels besides the four great bridges joining the two boroughs.

MISCELLANEOUS

Municipal Wharves on Proposed Waterway.

Springfield, Ill.—Governor Dunne is preparing for an emergency waterway program in the next general assembly. In a formal statement he urges all cities and villages along the route of the proposed channel to start at once to acquire property for municipal wharves and terminals. A Dunne measure passed at the last session known as the "public ownership" act gives the cities full power to acquire necessary lands for the business of wharfing through condemnation process. Plan No. 3, submitted recently by a corps of expert engineers, is the one the administration will advance in the legislature next winter. At an estimated cost of $3,075,000 it would supply the missing link between deep water at Joliet and a 7-foot depth in the Illinois River below La Salle, and would furnish a "lakes-to-gulf" artery of a minimum 7-foot depth. The plan calls for the utilization of the Illinois River for more than 46 of the 62 miles between La Salle and Joliet. For the rest of the way the channel is to debouch into the old Illinois and Michigan Canal, which is to be enlarged between Joliet and Dresden Heights and connected with the river. The old canal is also to be used in getting around the water power dam at Ballard's Island, near Marseilles. Governor Dunne recommends that all cities and municipalities proceed to co-operate for the purpose of establishing a uniform character of terminals that would be suited to the boats which would be engaged in transportation.

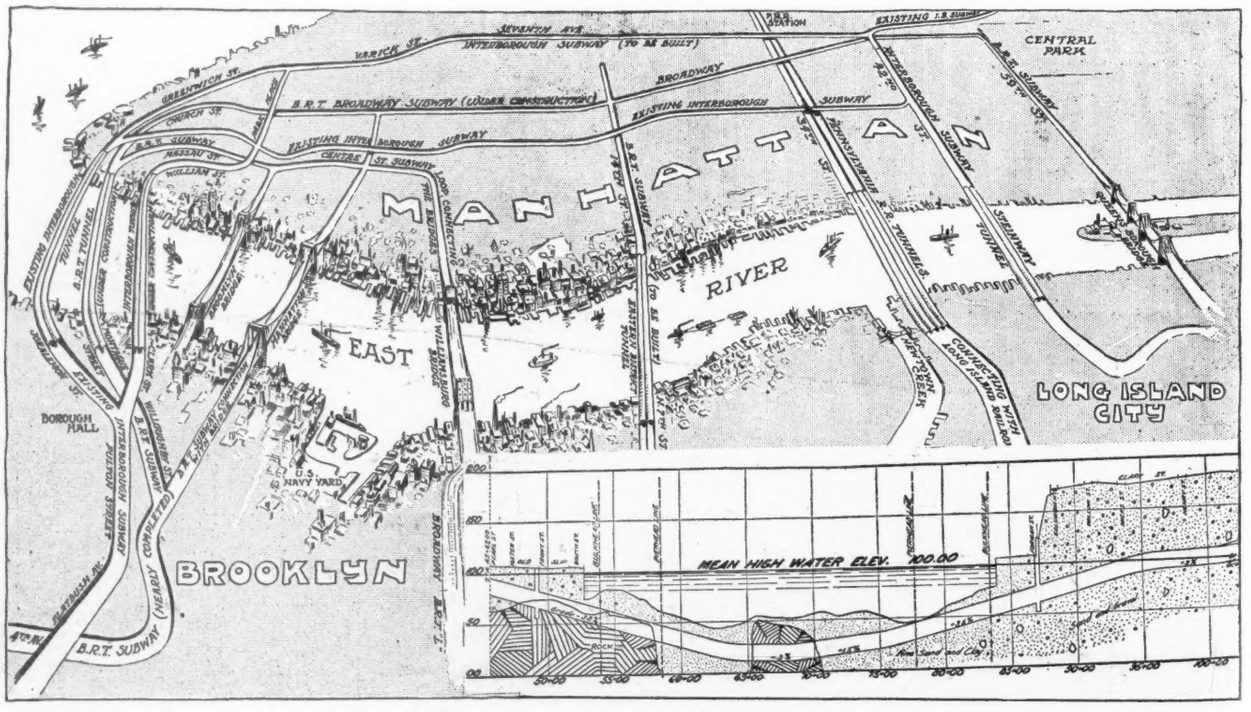
The Cities and the Unemployed.

Pittsburgh, Pa.—It is the plan of Mayor Joseph G. Armstrong to aid the unemployed people of the city by securing some work for them to do in connection with the improvement of Second avenue. A resolution passed by council requests that a conference be held consisting of the mayor and the directors of the different city departments to find out what can be done to take care of some of the unemployed people. Mayor Armstrong will call the conference immediately. $50,000 in bonds are available for the Second avenue improvement.

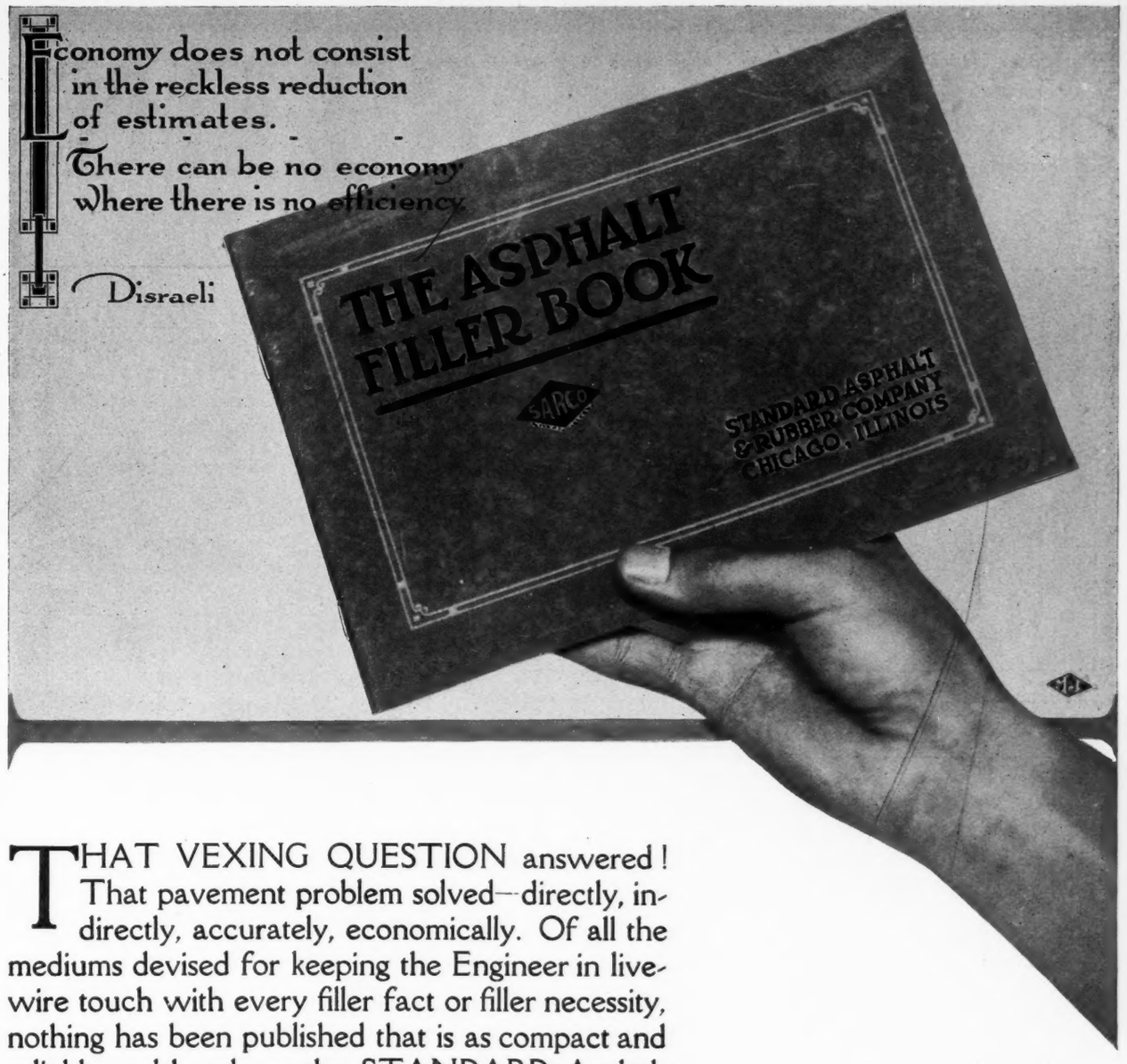
Philadelphia, Pa.—Assured by City Controller Walton that there is a balance of various items amounting to $1,131,000 available for immediate use on highway and survey work and a total of $9,303,929 in unencumbered loan balances which can be used for the starting of great public improvements, Mayor Blankenburg, Controller Walton and City Solicitor Ryan, in conjunction with members of the special joint councilmanic committee appointed to devise some means of aiding the unemployed in this city, will formulate plans for the beginning of work which it is expected will relieve the distress caused by business depression at the present time. To the mayor, city solicitor and city controller was left the task of ascertaining what funds were available for immediate use without further action on the part of councils; what funds can be made available with additional legislation and the form such legislation should take. They will report the result of their inquiry to councils committee, which will take action immediately.

Appearing in behalf of a number of the largest private charitable organizations of the city, R. M. Little, secretary of the Society for Organizing Charities, declared that the number of the unemployed in this city at the present time was little above normal, and that the maximum number of unemployed that would probably be found in this city during the coming winter would not exceed 100,000, or 20,000 above the average for the closing months of the year.

Portland, Ore.—The organizations of Portland and the city officials are determined this year that they will be prepared to meet the problem of the unemployed. Instead of digging into the city treasury to keep men housed in idleness, the city is to bend all its efforts toward finding work



JOINING BROOKLYN TO MANHATTAN.


Economy does not consist in the reckless reduction of estimates.
There can be no economy where there is no efficiency.
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BITULITHIC

"The Best by Every Test"

Marlboro Street, Boston, Mass. Finished Bitulithic Surface, laid over old macadam, June, 1914. Photograph taken October 22, 1914.

DEVELOPMENT OF BITULITHIC PAVEMENT

Year	Cities	Square Yards	
1901	7	16,400	
1902	33	400,831	
1903	40	915,630	
1904	45	1,041,724	
1905	42	1,041,327	
1906	57	1,508,095	
1907	66	1,924,222	
1908	62	1,676,433	
1909	74	2,071,987	
1910	97	3,047,276	
1911	99	4,189,182	
1912	150	4,830,601	
1913	129	5,081,068	
1914	125	5,831,283	Laid and under contract Sept. 30, 1914
Total		33,576,059	

equivalent to 1,907 miles roadway, 30 ft. wide between curbs

THE BITULITHIC pavement is built up to a high standard and not down to a low cost.

The greatest care is used in the construction of the BITULITHIC pavement. It renders unfailing service.

BITULITHIC is made of various sizes of the best stone obtainable, combined with bituminous cement and laid under close laboratory supervision.

BITULITHIC is a sign of progress for the cities that have their streets paved with it.

Specify BITULITHIC and have a pavement which is Unequalled in Reputation—Unquestioned in Quality—Unrivalled in Popularity.

Automobilists constantly traveling over BITULITHIC streets carry its praise everywhere.

Is not the experience of over 300 cities enough to satisfy you that in paving your streets with BITULITHIC, you have

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Write to-day for explanatory booklets and learn more about this modern ideal pavement for modern cities.

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NOTE: Follow the path to booths Nos. 41 to 44 at the American Road Congress in the Auditorium, Atlanta, Georgia, where you will find a most attractive display of samples and interesting literature regarding BITULITHIC pavement, which through its density and inherent stability stands out as a signal achievement in the street paving industry.

DON'T MISS SEEING THIS EXHIBIT

ASPHALT PAVING PLANTS

AND

Machinery of Any Description

WARREN BROTHERS COMPANY, 59 Temple Place, Boston, Mass.

Warrenite, The Ideal Country Road Surface. To General Road Contractors

Warrenite Cromwell Road, Cromwell, Conn. Laid over old macadam.

Warrenite Gehr-Ericson Road, King County, Wash. Laid 1911.

THE WARRENITE road surface is a modification of the Bitulithic street pavement adapted to meet the conditions which prevail on the country roads by the modern automobile traffic.

We wish to impress on the public and particularly on contractors who are experienced in general country highway construction, that we prefer not to take contracts for country roads. In pursuance of this, we sell the WARRENITE surface material, mixed, ready for use, to any contractor desiring to bid for the completed work, as stated in the WARRENITE specifications, as follows:

Warren Brothers Company, owner of the patents used in the construction of the Warrenite road, shall file with the proper official or board which is about to receive bids for the work, a properly executed binding agreement to furnish to any contractor desiring to bid for the work all the necessary Warrenite Surface material, mixed, ready for use, and Warrenite Cement and the sand, gravel, or stone screenings for the surface finish course, in accordance with Sections, "Wearing Surface," and "Surface Finish," at a definite reasonable price per ton. Said price shall include a license to use all of the patents required in the construction of the Warrenite road as herein specified.

The acceptance of bids by ..... and the letting of a contract for the same shall be deemed by **Warren Brothers Company** to be an acceptance of its proposal by..... and by the Contractor to whom such contract shall be awarded, and are all that shall be necessary to bind Warren Brothers Company to said agreement. The filing of a bid under these specifications will be construed as an acceptance of the terms of the license agreement filed by the Warren Brothers Company, at the price fixed in said agreement which is on file with the proper official or board.

Under this plan, general contractors may bid for the **WARRENITE** surface, buying surface material from us, just as they buy brick or other roadway surface materials from the manufacturers of those materials without the necessity of purchasing an expensive manufacturing plant and expert service and laboratory equipment, which are essential elements to successful results.

To this end, it is our policy to give every possible assistance to responsible road contractors.

Write to-day for **WARRENITE** circulars, specifications and form of mixture agreement, available to all contractors.

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Nashville, Tenn., 606 First Nat'l Bank Bldg.
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NOTE: If you attend the American Road Congress which is to be held in the Auditorium at Atlanta, Georgia, November 9th to 14th, inclusive, 1914, be sure and visit booths 41 to 44, inclusive, where you will find a most attractive display of samples and interesting literature regarding WARRENITE, the country road surface.

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Extend Your Firing Line

"Insist on Safety First"

You Can Place Your Supply Piles Continuously Along The Sides Of Street Or

road and the Koehring will go right down the middle on its own power, always setting a hot pace for your gang and always in exactly the right location for the most rapid work with the least handling and hauling of materials.

Into the vitals of the Koehring is built

the suggestions of the country's leading paving and road contractors,--IT FILLS THE BILL.

Koehring Machine Co.,

Milwaukee, Wis.

for those who will take it. J. H. Eurie, recently was appointed by Commisisoner Brewster as city job-hunter for the jobless. He is co-operating with the Municipal Free Employment Bureau. Mr. Brewster has decided to try the plan that was used successfully at Seattle last year—that of obtaining contracts for clearing land. The city has not yet decided whether it will establish a Municipal lodging house. Mayor Albee says that the city is looking for a suitable building.

Davenport, Iowa.—Steps toward an issue of $45,000 in permanent public improvement bonds, which will provide work during the winter for hundreds of idle citizens have been taken by the Davenport city council.

Niagara Falls, Ont.—Mayor O. E. Dores plans to put all the unemployed men in the city at work on the streets, making much needed improvements. The mayor said that he would endeavor to obtain from the Ontario government permission to draw enough money from the banks in excess of the annual appropriation to carry on the work. The number of men out of work here has increased considerably in the last few months.

Trenton, N. J.—Trenton is to have a Municipal Employment Bureau. It will be in operation very soon under the supervision of Charles E. Coleman, assistant overseer of the poor. The bureau will be stationed in the poor department of the city, and the chief aim will be to make the indigent persons of Trenton in a measure self-supporting and relieve the city of much of the burden it now bears in caring for hundreds of people each year.

New Municipal Market.

Chattanooga, Tenn.—Chattanooga's new municipal market house, which is now nearing completion after an expenditure of $25,000, will be formally opened very shortly by the board of commissioners.

Propose Control of Engineering.

Harrisburg, Pa.—Drafts of the proposed code for the supervision of the engineering profession in Pennsylvania have been submitted to the engineers of the state, and such other people who may be interested, at meetings held in Pittsburgh, Philadelphia and Harrisburg by the commission created by the last Legislature. The commission has made a study of the laws governing engineering in Europe and in the United States and drafted a proposed code for the licensing of engineers engaged upon the construction, maintenance and operation of public or private works where unusual hazards are offered. The commission is to make its report next month.

Pittsburgh Beautifying Its Hills.

Pittsburgh, Pa.—Pittsburgh's slowly-developed esthetic taste is turning to the bare hills of the city for expression. The bald knobs that wall in the city of Pittsburgh and give it a bare rugged horizon-line are to be transformed into vine-clad and tree-crested hills. Public Works Director Robert Swan and George W. Burke, Supt. of City Parks, have imported from Asia Minor, large quantities of lycium vine. The drab slopes are to be planted with this vine which, when matured, has a bright red hue. It requires no attention and very little nourishment. Another quality that recommends it to Pittsburgh is that it is impervious to smoke, gases, fogs and weather. Upon the summits of all the hills sumac trees and a species of sturdy locust will be planted. Supt. Burke declares that within ten years the hills of Pittsburgh will be as noted for their beauty as they now are for their ugliness.

Wins in Shade Tree Contest.

Boston, Mass.—The Massachusetts Forest Association has made its final report on the winners of the shade tree planting contest, which started last spring and closed last July. Fifty-eight cities and towns entered the contest. In all, 12,498 trees, or about 60 miles, were planted by 44 of the entries. The town of Scituate was awarded first prize for superior trees and planting the largest number. It will be beautified by one mile of sugar maple, shade trees, 215 in number, which will be planted this fall. The second and third prizes were awarded to the towns of West Tisbury and Marshfield, on the cape.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Letting of Contracts—Construction of Statutes.

Stratton v. Allegheny Co., et al.—The statutes requiring that contracts relating to city affairs be let, after advertisement, to the lowest responsible bidder, do not apply to a contract by a city for the employment of an architect for the erection of a public building.—Supreme Court of Pennsylvania, 91 A. R., 894.

Carrier—Operation of Car—Negligence.

Einertsen v. United Railroads of San Francisco.—In an action for injuries to a street car passenger by being struck by a truck extending from the curb into the street, evidence held to sustain the trial court's finding that the car, as it passed the truck, was moving at a dangerous speed, that the carrier was negligent in permitting the steps of the car to become crowded, so that plaintiff when he boarded the car had to stand on the step, and that he was not therefore guilty of contributory negligence in assuming such position.—District Court of Appeals, First District, California, 142 N R 1086.

Municipal Corporations—Term of Office.

Wilson, Att'y Gen., ex rel Hall v. McCarron.—Under Sp. Laws 1878-80, c. 293, § 1, providing that the city marshal of the city of Lewiston shall hold office for two years, a city marshal holds office for the full term of two years from his appointment, whether appointed at the beginning of one of the successive periods of two years counting from the date the act became effective, or to succeed one who did not serve out the full term, especially as the word "term" means a limited or definite extent of time, or the time for which anything lasts, and, when used with reference to the tenure of office, ordinarily refers to a fixed and definite time, and is used in the act to designate a fixed, definite time that the person appointed shall hold the office.—Supreme Judicial Court of Maine, 91 A. R. 813.

Streets—Collision with Automobile—Duty to Anticipate Danger.

Mickelson v. Fisher et ux.—Where plaintiff, having alighted from a street car, looked to see if any vehicle was approaching on the same side she alighted, and, seeing there was none, started to cross the car track to the opposite side of the street, when she was struck by an automobile which had turned to pass the car to the left, on its stopping to discharge passengers, plaintiff was not bound to anticipate that a car or other vehicle would approach from that direction on the left side of the street, but was entitled to assume that the law of the road, requiring vehicles to travel on the right side, would be observed.—Supreme Court of Washington, 142 P. R., 1160.

Liability—Contract With City for Use of Scow.

Weehawken Dry Dock Co. v. City of New York.—A firm contracted with the city of New York to remove with its tugs scows loaded with street sweepings and ashes by the street cleaning department, and dispose of their contents. The scows were owned by the department, and the contractors were charged by the day for their use. In practice, when a scow was emptied, it was returned to a dump for reloading, and delivered to the inspector in charge, and was then credited to the contractors, until the time it was again taken out. Another concern also had the privilege of sorting the refuse after loading before the scow was delivered to the contractors for removal. Held, that after a scow was returned to an inspector, and until it was again loaded and delivered to the contractors, they were not responsible for its handling, and that the city was alone liable for damage caused by a collision between a loaded scow which had been removed from the dump by direction of the inspector, and tied up outside of another and a schooner lying at a wharf, against which the scow drifted after breaking loose because of being insufficiently secured.—District Court S. D. New York, 215 F. D. 647.

Municipal Bond Elections—Commissioners of Public Works—Statutes.

Weeks et al. v. Bryant, Mayor, et al.—The act providing for the commission form of city government does not abrogate the statute, which provides that at a municipal bond election the commissioners of public works shall be elected, and prescribes their powers and duties.—Supreme Court of South Carolina, 82 S. E. R. 988.

Municipal Bond Election—Petition and Ballots.

Herbert v. Griffith, Mayor, et al.—Under Civ. Code 1912, section 3050, providing for special elections on the issuance of municipal bonds for "waterworks or sewerage," petitions and ballots for an election on the issuance of bonds for waterworks and sewerage invalidated the election, where they contained no separate statement of the amount to be expended for each.—Supreme Court of South Carolina, 82 S. E. R. 986.

Street Improvements—Petition.

Gibson v. Troupe et al.—Section 5110, Rev. St. 1913, requiring a petition of three-fifths of the resident property owners for paving or for constructing sidewalks, or a vote of three-fourths of all the members of the council or board of trustees, does not apply to temporary walks on ungraded and unimproved streets. Section 5112 provides for such walks, and that section contains no such requirements.—Supreme Court of Nebraska, 148 N. W. R. 944.

Highways—Improvements—Validity of Bond Consideration.

Village of Senaca Falls v. Botsch et al.—Where a contractor had constructed a highway for the state, and, after the work was completed and accepted, the state refused to pay therefor until he wave a bond guaranteeing, beyond the terms of the contract, to keep that portion of the highway lying within a village in good repair, a bond given pursuant to such demand and running to the village was unenforceable because without consideration.—Supreme Court, Special Term, Seneca County, 149 N. Y. S. 320.

Powers—Ordinances—Validity.

City of Chicago v. Maudee Bros.—The authority of a city council to pass an ordinance depends on statute conferring the authority, and any reasonable doubt of its existence must be solved against the right of the city to exercise the power. A municipal ordinance, which prohibits the retail sale of goods on a floor more than 20 feet below the street grade, but which permits the use of 12 stories above the street for the retail sale of goods, and permits the use of stories above the twelfth, if equipped with an approved automatic sprinkler system and inclosed stairways, is not unreasonable, so far as it applies to the basement, as against the objection that a basement may be made as safe as any floor above the street, since that was a question for the council adopting the ordinance.—Supreme Court of Illinois, 106 N. E. R. 181.

Defective Sidewalks—Negligence.

Darden et ux. v. Town of Plymouth.—Plaintiff, while walking along a sidewalk at night under a shed opposite a warehouse, struck an obstruction on the walk and fell and was injured. The surface of the walk was uneven by reason of loose brick and pieces of lumber thereon, and the opposite walk was also obstructed by brick and building material placed there for the erection of a building on that side. There were electric lights in the town, but they were so placed that the shadow of the warehouse and the shed over the sidewalk prevented proper effect, and it was dark at the time and place of the injury. The walk had been in such condition for two months or more. The warehouse belonged to one of the town aldermen, and the chief of police passed over the place two or three times every day. Held, that the facts were sufficient to charge the town with actionable negligence. Previous knowledge of a defect in a sidewalk on the part of a person injured does not establish negligence on his part as a matter of law.—Supreme Court of North Carolina, 82 S. E. R., 829.

Construction Contract—Arbitrator.

City of Chicago v. Agnew et al.—Where, by a contract for the construction of a municipal tunnel under Lake Michigan, the commissioner of public works of the city was authorized to determine whether the contractor was entitled to payments as the work progressed, and the amount thereof, such commissioner was not a mere officer of the city authorized to act for it, but was an arbitrator with power to approve the estimates of work done in accordance with the contract.—Supreme Court of Illinois, 106 N. E. R. 252.

Street Defects—Reflooring Viaducts.

City of Pueblo v. Smith.—It having become necessary to refloor a viaduct in defendant city, the work was done with three-inch plank which varied somewhat in thickness. The planks were laid lengthwise on the bridge, and the difference in thickness caused an unevenness in the floor where they came together, varying in some places from a quarter to three-quarters of an inch. Plaintiff riding a bicycle between the rails of a street car track over the viaduct, on hearing a car behind him, attempted to ride off the track and, striking one of the raised edges of plank, fell and was injured. Held, that such unevenness did not constitute actionable negligence on the part of the city.—Supreme Court of Colorado, 143 P. R. 281.

Contract for Public Improvement—Rights of Assignees.

Spear v. Board of Public Works of Gaffney et al.—Where a contractor, engaged by a city to construct a pumping station, under a contract that if defective material was put into the plant it might be remedied at his expense, and that the contractor should save the city harmless from all claims of materialmen, agreed with the city to permit it to hold back one-third of the contract price until the work was accepted, a subsequent assignee of any funds coming to the contractor cannot, though the assignment was accepted by the municipality, recover against the municipality, where it paid the claims of prior assignees, and the fund remaining at the completion of the work was insufficient to discharge the full amount of the order.—Supreme Court of South Carolina, 82 S. E. R. 1010.

Railroad Corporations—Aid—Construction—Tunnel.

Lord v. City and County of Denver.—Denver Charter Amendment, May 20, 1913, section 355, created a tunnel commission to construct a railroad tunnel through the Rocky Mountains to transport freight, passengers, water, and electricity, provided that if the tunnel should be originally constructed for the transportation of freight and passengers, that right should not be destroyed or needlessly interrupted by the extension of the use for the passage of water, electricity, etc. The amendment also provided that two-thirds of the cost of the tunnel should be paid by a bond issue of the city; that the other third should be paid by a railroad company, which should have the right to operate trains through the tunnel, the title to which should be in the city, but with the right of the railroad company to purchase the same. The city had not declared its intention to build a water system, power plant, or any public utility of which the tunnel was to form a part, nor by which it was to be of any use to the city whatsoever. It was to have the perpetual right to use the tunnel free of rent, as an aqueduct, and to install conduits therein to bring water into the city, to operate a pipe line, and an electric line through the tunnel, and to use it for drainage if it so desired, also to have full benefit of any ore that might be found in driving the tunnel, and the right to subject it and the tracks herein to use of any other railroad desiring the same on terms which would be exceedingly onerous to any other railroad. Held, that the ordinance was violative of Const. art. 11, sections 1, 2, prohibiting a city from lending its credit to any company or corporation for any purpose, and from making a donation of money or bonds in furtherance of a work jointly with any person, company, or corporation, etc.—Supreme Court of Colorado, 143 P. R. 284.

NEWS OF THE SOCIETIES

Calendar of Meetings.

FOURTH AMERICAN ROAD CONGRESS.—American Highway Assoc. and American Automobile Assoc., Atlanta, Ga. Secretary, J. S. Pennybacker, Colorado Building, Washington, D. C.

Nov. 10-11.
LEAGUE OF TEXAS MUNICIPALITIES.—Annual Meeting, Houston, Tex. President, Mayor A. P. Wooldridge, Austin.

NOV. 12-14.
CONFERENCE OF AMERICAN MAYORS.—Bellevue-Stratford Hotel, Philadelphia, Pa.

Nov. 16 and 17.
MONTANA MUNICIPALITIES.—Third Annual Meeting held at Billings, Mont. Robert Leavens, Mayor of Billings.

Nov. 17-21.
NATIONAL MUNICIPAL LEAGUE.—Annual Convention, Baltimore, Md. Secretary, Clinton Rogers Woodruff, North American Building, Philadelphia, Pa.

Nov. 18-20.
WASHINGTON STATE GOOD ROADS ASSOCIATION.—Spokane, Wash. Secretary, M. D. Lechey, Alaska Building, Seattle, Wash.

NOV. 23-28.
EXHIBITION OF STREET CLEANING APPLIANCES.—Department of Street Cleaning, City of New York. J. T. Fetherston, Commissioner of Street Cleaning.

Nov. 30-Dec. 6.
AMERICAN PUBLIC HEALTH ASSOCIATION.—Forty-second Annual Convention, Jacksonville, Fla. Dr. C. E. Terry, Chm., Executive Committee.

Dec. 1-4.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Municipal Day, Dec. 3, Report of Snow Removal Conference Committee—Annual Meeting, Engineering Societies Building, 29 West 39th street, New York. M. L. Cooke, Director Public Service, Philadelphia, Pa.

Dec. 2, 3, 4.
CITY MANAGERS' CONVENTION.—Springfield, Ohio. C. E. Ashburner, City Mgr., Springfield.

Dec. 14-18.
AMERICAN ROAD BUILDERS' ASSOCIATION.—11th Annual Convention; 5th Annual Good Roads Congress, and 6th Annual Exhibition of Machinery and Materials, International Amphitheatre, Chicago, Ill. Secretary, E. L. Powers, 150 Nassau st., New York, N. Y.

Feb. 10-17, 1915.
EIGHTH CHICAGO CEMENT SHOW.—Coliseum, Chicago, Ill. Cement Products Exhibition Co., J. P. Beck, General Manager, 208 S. La Salle Street, Chicago, Ill.

May 10-14, 1915.
AMERICAN WATERWORKS ASSOCIATION.—Annual Convention Cincinnati, O. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

June 14-16, 1915.
SOUTHWESTERN WATERWORKS ASSOCIATION.—Annual Convention, Galveston, Tex. Secretary, F. L. Fulkerson, Waco, Tex.

THE CONFERENCE OF AMERICAN MAYORS.

The conference of American Mayors on Public Policies as to Municipal Utilities has been called by Mayors Rudolph Blankenburg of Philadelphia, John Purroy Mitchel of New York, Carter H. Harrison of Chicago, Newton D. Baker of Cleveland and George W. Shroyer of Dayton for Nov. 12, 13 and 14 in Philadelphia. The program for the six sessions follows:

Thursday, Nov. 12.

8.15 p. m., at Bellevue-Stratford Hotel.—Reception to visiting mayors and delegates by a distinguished reception committee and address of welcome by Hon. John K. Tener, Governor of Pennsylvania.

Friday, Nov. 13.

10.30 a. m., at Bellevue-Stratford Hotel.—"Practical Utility Problems." Mayor Blankenburg, presiding officer.

"Fundamental Planks in a Public Utility Program," Delos F. Wilcox, franchise expert, New York.

"The Regulation of Municipal Utilities," Nathaniel T. Guernsey, General Counsel, American Telegraph and Telephone Co., New York.

"Philadelphia's Transit Problems," A. Merritt Taylor, Director of City Transit, Philadelphia.

"Municipal Lighting Rates," Ray Palmer, Commissioner of Gas and Electricity, Chicago.

"Labor's Interests in Public Utilities," open discussion.

2.15 p. m. at Bellevue-Stratford Hotel. "The Regulation of Utilities."

"Some Present Day Issues in Regulation," Edward W. Bemis, Chicago, member of Board of Supervising Engineers, Chicago; Valuation Bureau of Public Utilities Commission of District of Columbia.

"What Certain Cities have Accomplished Without State Regulation," Stiles P. Jones, Secretary Voters' League, Minneapolis, Minn.

"A Constructive Policy for Public Service Corporations," Charles Day, of Day & Zimmerman, Philadelphia.

"What Legislation Must Accomplish If It Is To Be Permanent," Hon. John M. Eshleman, President Railroad Commission of California.

8:15 P. M., at Central High School. Under the auspices of the American Academy of Political and Social Science. "Local and State Regulation of Municipal Utilities." Mayor Mitchel, presiding officer.

Addresses and discussion by Hon. Halford Erickson, Member of Railroad Commission of Wisconsin; Hon. Milo R. Maltbie, Member of Public Service Commission for the First District, New York; Prof. Charles E. Merriam, Professor of Political Science, University of Chicago; Hon. Ira W. Stratton, Mayor of Reading, Pa.

Saturday, November 14.

10.30 A. M., at Bellevue-Stratford Hotel. "Municipal Ownership and Operation." Mayor Baker, Presiding Officer.

"Municipal Ownership—The Testimony of Foreign Experience," Frederick C. Howe, Commissioner of Immigration, New York.

Fifteen-minute reports from managers of typical municipal plants.

Open discussion led by Clarke M. Rosencrantz, of General Counsel, Milwaukee Electric Railway and Light Company and Hon. Robert Crosser, United States Congressman from Ohio, Member of Committee on District of Columbia.

2.15 P. M. Executive Session open only to Mayors and Delegates.

Round Table Discussion on "Elements in a Constructive Utility Program."

8.15 p. m., at Witherspoon Hall, under the auspices of the American Academy of Political and Social Science. "Holding Companies and the Public Welfare." Hon. Franklin K. Lane, Secretary of the Interior, Presiding Officer.

Addresses and discussion by Francis T. Homer, of Bertram, Griscom & Co., New York; Charles T. Mathewson, of Counsel, Consolidated Gas Co., New York; James P. Goodrich, Director National City Bank, Indianapolis; Louis D. Brandeis, Lawyer, Boston.

The headquarters of the conference will be the Bellevue-Stratford Hotel, Broad and Walnut streets, where a Bureau of Information will be established for the members and guests.

The Municipal Home Rule League of Pennsylvania will hold meetings concurrently.

At the time of the publication of the program, 105 cities had accepted the invitation to send delegates.

A Utilities Bureau has been organized by the mayors calling the conference, the purposes of which are:

1. To serve as a national agency through which American cities may co-operate in exchanging data as to rates, service standards and cost factors in municipal utilities.

2. To advise cities as to the best plans and methods for their utility campaigns.

3. To publish and disseminite information pertaining to service standards, rates, franchises, public contracts, and any and all other matters of interest and value to the public, regarding the operation, construction, maintenance and regulation of public utilities.

4. To assist, upon request, in the proper and adequate presentation of the interests of the city and the public in hearings on utility matters before public service commissions or other regulative or judicial bodies.

The Utilities Board, which has temporary headquarters in room 216, City Hall, Philadelphia, consists of Louis D. Brandeis, Lawyer, Boston, Counsel for Interstate Commerce Commission in hearings on application of Eastern Railroads for 5 per cent increase; Frederick A. Cleveland, Political Economist, New York, Director of New York Bureau of Municipal Research; S. S. Fels, Manufacturer, Philadelphia; Felix Frankfurter, Administrator and Lawyer, Cambridge, Mass., Professor of Law, Harvard University; Charles F. Jenkins, Publisher, Philadelphia, Proprietor, Farm Journal; Leo S. Rowe, Educator, Philadelphia, Professor of Political Science, University of Pennsylvania, President, American Academy of Political and Social Science; Frederick W. Taylor, Consulting Engineer, Philadelphia, Past President, American Society of Mechanical Engineers; Charles R. Van Hise, Educator, Madison, Was., President, University of Wisconsin.

National Municipal League.

In connection with the annual meeting of the National Municipal League in Baltimore, November 18-20, there will be a conference of Secretaries of State Leagues of Municipalities. The committee having charge of this conference, of which William P. Capes,

secretary of the Conference of New York Mayors and Other City Officials, is chairman, has prepared the following subjects for discussion:

Organization and Membership:

"Should civic clubs, commercial clubs and individuals be invited to join?" "Should the unit of membership be the municipality or the official?" "Annual dues, amount and by whom and when paid?" "How can interest and membership be increased?"

Meetings and Publications:

"Frequency and length of meetings." "Character of program." "Kind of publications." "Should convention and program be subdivided into departments and provide sub-organizations?" "Should state organizations publish journals?" "Could a group of leagues issue such publication?" "Could one publication serve all?"

Co-operation:

"How can the state organizations be brought into an effective plan of co-operation?" "Relations with bureaus of municipal research, the National League of Municipalities and the National Municipal League." "Should there be a federation of state organizations? If so, what and how?" "Necessity for each organization to have a paid executive officer." "The State League and the Legislature." "Possibilities of continuing service for cities."

New England Waterworks Association.

The November meeting will be held at Hotel Brunswick, Copley Square, Boston, Wednesday, November 11, 1914. The program follows:

11 a. m.—Meeting of the executive committee at the headquarters, Tremont Temple.

1 p. m.—Lunch will be served at Hotel Brunswick, Copley Square.

2 p. m.—Papers: "Sterilization of Water with Ultra-Violet Rays," by Max von Recklinghausen, Ph. D., Strassburg. "The Use of Ozone as a Sterilizing Agent for Water Purification," by Sheppard T. Powell, chemist, Baltimore County Water and Electric Company. "Water Rates," by B. M. Wagner, C. E., Rockville Center, N. Y.

Topical Discussion on the General Subject of Service Pipes—Methods Used; Methods of Making Connection at Main; Depth of Laying; Troubles from Freezing; Methods of Thawing, etc. To be opened by Mr. E. C. Brooks and Mr. F. F. Forbes.

Committee on papers: George C. Whipple, F. F. Forbes, William E. Foss, Hiram A. Miller, John C. Whitney.

League of Texas Municipalities.

The program of the second annual meeting of the League of Texas Municipalities, to be held Nov. 10 and 11 at Houston, was announced by Mayor A. P. Wooldridge of Austin, president of the league. Following is the program:

9 a. m., Tuesday, Nov. 10.—Meeting called to order by president. 1. Address of welcome, J. C. Hutcheson, Jr., Houston, Texas, third vice-president League Texas Municipalities. 2. Response on behalf of visiting officials, Mayor Ed. H. McCuistion, Paris, Texas. 3. President's address, Mayor A. P. Wooldridge, Austin, Texas. 4. Roll call of cities represented at the meeting.

2 p. m. Tuesday.—1. Report of secretary-treasurer. 2. Report of standing committees. 3. Election of officers.

8 p. m. Tuesday.—1. "History and Theory of City Manager Plan of Municipal Government," Prof. Herman G. James, University of Texas. 2. "City Manager Plan in Practice," M. H. Hardin, Amarillo, Texas. 3. "Some Features of the Commission Form of Government of Houston, Texas," Mayor Ben Campbell.

9 a. m. Wednesday, Nov. 11.—1. "State Supervision of Water Supplies in Its Relation to the Public Health," Dr. Charles Saville, Boston, Mass. 2. Round table discussion of the following topics: (a) "One Year of Municipal Home Rule in Texas; Lessons and Results." (b) "Municipal Taxation."

2 p. m. Wednesday.—Trip down Houston Ship Channel to San Jacinto Battleground and return, as guests of city of Houston.

Ontario Fire Chiefs.

Ottawa was selected as the place for next year's convention at the convention held Oct. 19-20 at Stratford, Ont. The decision on this and the selection of officers occupied the attention during the closing session. The selection of officers resulted as follows: President, Chief Earl of Milton; vice-president, Chief Graham of Ottawa; secretary, ex-Chief Finch, of Guelph (re-elected); treasurer, Chief Keyes, of Galt (re-elected); board of directors, Chief Aitken, of London; Chief Armstrong, of Kingston; Chief Thompson, of Toronto; auditors, Chief Knowles, of Dundas; Chief McLeod, of Port Arthur; Chief Thompson, of Owen Sound.

Pennsylvania State Association of Chiefs of Police.

Twenty-seven chiefs of municipal and railroad police departments organized on Sept. 15 the Pennsylvania State Association of Chiefs of Police, which aims for greater co-operation among Pennsylvania police, elevating standards of police work, obtaining more humane conditions and general advancement in the work of the guardians of the peace. Heads of departments in cities with a population of 300 or more are eligible to membership, as well as railroad chiefs. The following officers were elected. James N. Tillard, Altoona, president; Charles Evans, South Bethlehem, vice-president; George W. Harderg, Williamsport, secretary-treasurer; James Robinson, Philadelphia, executive secretary. John K. Royal and Spencer S. DeGolier, mayors of Harrisburg and Bradford, respectively, were elected honorary members.

(Continued on page 685.)

PERSONALS

The following officials have been elected in Alabama:

Lineville—C. S. Phillips, mayor; L. J. Tramnell, J. A. Smith, W. E. Blanks, J. C. Weaver and T. R. Bell, council.

Cardiff—James Williamson, mayor; W. M. Rodgers, Louis Negrow, B. Fambrello, John Burrel, H. D. Davis, aldermen.

Heflin—R. A. Perryman, mayor; J. A. Owens, J. C. Bean, F. A. Harper, J. J. Wagner and A. L. Black, council.

Town Creek—H. G. Almon, mayor; R. N. Harris, R. N. Streater, W. J. Lee, J. F. Smith and L. E. Sanderson, aldermen.

North Johns—M. P. Champion, mayor; J. B. Dicus, J. Granger, Jr., G. H. Parsons, W. C. Cargile and J. H. Huddleston, aldermen.

Moulton—Paul White, mayor; C. C. Kirby, C. C. Prince, Dr. S. R. Sanders, R. Stockton and A. J. Wade, aldermen.

Columbiana—L. H. Ellis, mayor; J. F. Harper, T. J. Miner, W. Morrow, T. R. Walton and J. Verschot, council.

Decatur—James A. Nelson, mayor. The following committees were appointed: Street—R. P. McEntyre, J. D. Wyker and Dr. W. H. Watson; fire, water and light—J. A. Thomason, R. P. McEntyre and C. Hendrix. The following officers were appointed: F. W. Collins, city clerk; W. A. Pettey, chief of police; J. S. Asker, fire chief.

Bessemer—I. A. Lewis, mayor; G. Ross, president of council; A. W. Deason, M, E. Crotwell, W. E. Lurratt, Dr. J. S. Winters, E. Milton, W. A. Simmons, J. W. Brooks, J. S. Edwards, E. L. Henry and J. N. Smithson, aldermen.

The following officials have been elected:

Mayport, Fla.—A. J. Floyd, mayor; W. J. King, Fred Torable, Sam Floyd, J. D. McCormick and A. Greenberg, city council; Roland King, city clerk; Fred Floyd, treasurer; Tony Meier, marshal.

Milton, Fla.—J. H. Collins, mayor; W. J. Williams, clerk; Henry Barnes, C. E. Hamilton, W. N. Fisher, Wm. Davison, aldermen.

Newport News, Va.—T. E. Pearse, city engineer; F. Hudgins, city clerk; W. K. Stow, fire chief; J. W. Ayler, city physician; T. J. Pretlow, health officer; R. Goodwin, city electrician; Dr. G. J. Williams, M. R. Piland, S. Edwards and Dr. A. Davis, board of health.

Jacksonville, Fla.—S. H. Kooker was elected mayor; E. E. Harris was named as clerk; T. J. Brundrix was chosen city marshal. The city councilmen elected are: J. O. Wingate, G. C. Spencer, Henry T. Slappy, J. U. Parker, A. Henchey, C. A. Peterson, J. W. Gooding, P. L. Cone and L. C. Wilkerson.

Morganza, La.—R. B. Phillips was elected mayor to succeed A. McFarland, who was elected parish superintendent of education.

NEW APPLIANCES

VULCAN MOTOR TRUCKS.

With a Wide Range of Capacities and Services.

Vulcan motor trucks are made in sizes of 2, 3, 4, 4½, 5 and 7-tons and with a variety of fixed and dumping bodies to make them available for all hauling and contractors' other service. Vulcan trucks have been designed with a view to stability obtained by means of correct proportioning of parts.

The Vulcan power plant consists of a Vulcan 4-cylinder, 4-cycle water-cooled motor with a bore and stroke of 4⅜ by 5½ inches up to and including the 5-ton truck, and 4¾ by 5½ in the 7-ton. The valves are located conveniently on the left side of the motor and easy access is afforded to all moving parts by the removal of hand plates. Suspension is of the three-point type. The crank-shaft is made of 3½ per cent nickeled steel in order to withstand the heavy strain. In order to insure uninterrupted lubrication a useful tell-tale is located on the dash which tells the driver the condition of the gear pump, piping and oiling connections.

The gear case is of aluminum and stoutly ribbed on its exterior. The differential is of beveled type and flanged to the gear case. The gears are designed to stand inexperienced handling since they are in constant use and the dog clutches engaging them are under control of mechanism that acts in response to the removal of the motor torque. The control and steering are easy. Three speeds and reverse are provided in the smaller sizes and four speeds and reverse on the 7-ton rating. The driving sprocket and radius rod are of liberal proportions.

Detailed specifications of the five-ton truck follow:

Speeds—Three forward speeds and one reverse speed, giving at 1,000 R. P. M. 13.30, 6.43, 3.23 miles per hour forward and 2.51 reverse.
Tread—66 inches.
Wheel Base—13 feet 6 inches.
Wheels—Artillery type, detachable tires.
Front Tires—36 x 6 inches, single.
Rear Tires—36 x 6 inches, dual.
Chassis—Length over all, 238 inches. Width of frame, 36½ inches. Length of frame behind driver's seat, 141½ inches. Height of chassis above ground, loaded, 36½ inches. Frame, pressed steel, 6¾ inches deep by 3½ inches wide.
Motor—Gasoline, 4-cycle, 4-cylinder, water cooled, 4⅜-inch bore by 5½-inch stroke. Cylinders cast in pairs with inlet and exhaust valves located on left-hand side of motor and operated by one cam shaft. Valves, poppet type. Lubrication, splash and pump. Water cooling, Thermo-syphon. A. L. A. M. normal rating, 30 H. P. Motor under hood, forward of driver's seat.
Cooling System—Truck type radiator of ample size, forward of hood. Air circulation by fan.
Ignition—Bosch high tension dual magneto and six-volt accumulator with switch on dashboard.
Carburetor—Stromberg.
Clutch—Cone type, leather faced, adjustable.
Driving Shaft—Of large diameter, fitted with universal joints, drive being "straight line" under all conditions.
Transmission—Three-speed type. Constant mesh gears, 1¼-inch face. Differential and bevel gears enclosed in transmission case. Direct drive on high gear. All shafts carried on large annular ball bearings. Chain drive to road wheels.
Brakes—One service brake located on jackshaft. Drum, 11¾-inch diameter, 3½-inch face. Renewable shoes, Raybestos lined. Emergency brakes on rear hubs. Drum, 15-inch diameter, 4-inch face. Renewable shoes, Raybestos lined.
Front Axle—Drop forged I-beam section.
Rear Axle—3 1/16-inch diameter, nickel steel. Timkin roller bearings.
Steering Gear—Worm and sector type, controlling front wheels by forged levers and transverse rod at rear of front axle.

Vulcan trucks are made by the Driggs-Seabury Ordnance Corporation, Sharon, Pa.

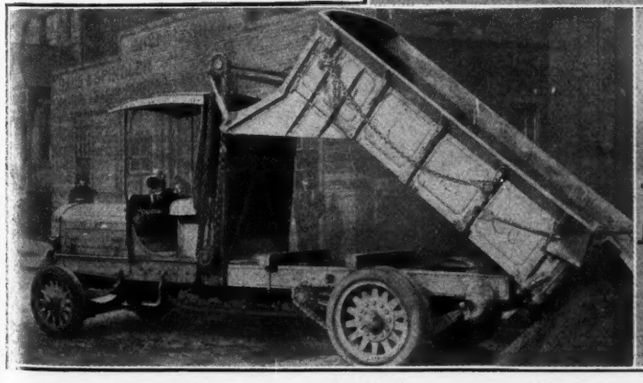
TRANSIT TRUCKS.

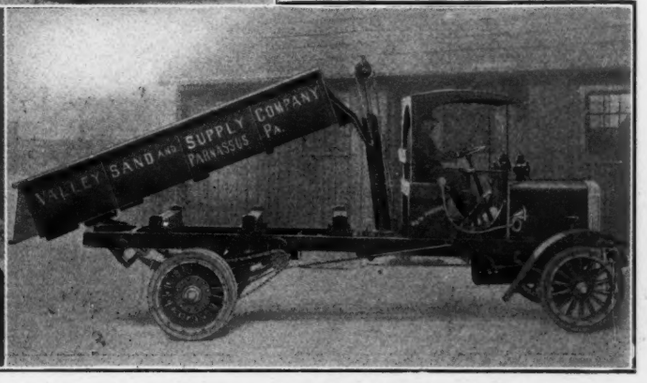
In Convenient Sizes and Designs.

Transit motor trucks are designed to use principal parts of well-recognized make and to embody these in a durable and serviceable construction. These trucks are made in 1, 2, 3½ and 5-ton models. In transit trucks "Continental" motors and Timken bearings are used. The trucks are so designed that two-thirds of the load is on the rear wheels and the driver's seat is mounted over the motor so that there is a maximum of loading space without excessive overhang back of the rear axle. The radiator suspension consists of a universal ball-and-socket joint suspended between two springs. The steering gear is Ross and is irreversible and provided with ball-bearing threads.

The motor is provided with an automatic governor which is sealed and cannot be tampered with by the driver without the owner's knowledge so that the truck is protected from racing. The motor is 4-cylinder, 4-cycle, water-cooled, with cylinders of "L" type cast in pairs. Detailed specifications are as follows for the five-ton truck:

Frame—Pressed steel, 6 13/16 inches deep in center, cross-members, pressed steel having integral gussets, giving great strength. Length of frame, 222 inches; width of frame outside, 39 inches.
Wheel Base—Standard 144 inches. Longer if desired.
Trend—72 inches.
Wheels—Artillery type wood, made of first quality second-growth hickory.
Tires—Solid rubber. Front 36x6 inches, rear double 40x6 inches; either block type or endless as desired.
Front Axle—Timken Drop-Forged I-Beam section. Spindles as well as steering knuckles are fitted with Timken roller bearings.
Rear Axle—Timken rectangular section, 2¾x4¾ inches. Spindles 3¾ inches diameter and fitted with Timken roller bearings.
Transmission—Selective, combined with jack-shaft; three speeds forward and a reverse. Alloy steel gears.
Jack-shaft—Timken full floating type, fitted with Timken roller bearings throughout.
Drive—Alloy nickel steel propeller shaft from clutch to transmission, in direct line with engine





7-Ton (Pittsburgh Contracting Co., New York City, N. Y.
VULCAN TRUCKS.
7-Ton (Iron City Sand Co., Pittsburgh, Pa.) 5-Ton (Valley Sand & Supply Co., Parnassus, Pa.)

shaft and fitted with two universal joints. Final drive from counter-shaft to rear wheels by side chains, detachable roller type.

Brakes—Two independent sets—emergency on rear hubs, service on ends of jack-shaft outside of sprockets, making them accessible and easy of adjustment.

Steering Gear—Ross Model B. F. Irreversible. Built for hard service. Steering wheel 22 inches diameter.

Clutch—Hele-Shaw Multiple Disc, running in oil. Interconnected with foot brake.

Motor—Continental heavy duty, 4-cylinder, 4-cycle, water-cooled, 4½-inch bore, 5½-inch stroke. Cylinders L type, cast in pairs. Equipped with automatic sealed governor. Self-contained oiling system, two plunger pumps driven by eccentrics from center of cam shaft, positive force-feed and splash.

Ignition—Jump spark, High Tension Mea Magneto. (Other makes of Magnetos furnished as an option.)

Radiator—Honeycomb type, mounted on ball-and-socket supports with spring suspension. Water circulated by centrifugal pump.

Control—Spark and throttle levers on steering column. Change speed and emergency brake levers at right of driver's seat. Clutch and service brake operated by pedals. Clutch interconnected with foot brake.

Gasoline Tank—Under seat; capacity 25 gallons.

Speed—Maximum 10½ miles per hour, controlled by governor, which is sealed so that it can not be tampered with by driver.

Equipment—Two side and one oil tail lamp, exhaust horn, hub odometer, governor, and complete set of tools, including jack.

The illustrations show a plan-view of the chassis of model T, 3½-ton truck and truck with an all-steel dump body for hauling sand, gravel, asphalt, crushed rock and similar materials. The joints of the body are welded to make a seamless structure free from rivets so that a smooth surface is left on the inside. The front end is easily elevated by a screw hoist, operated by a hand-wheel so that the load is completely discharged without shoveling. The dump body is furnished in any capacity and may be obtained either side or rear dumping, hand or power operated.

These trucks are made by the Transit Motor Truck Co., Inc., Louisville, Ky.

A POWER-DRIVEN GRADER.

The Dennis Turbine Traction Grader and Loader.

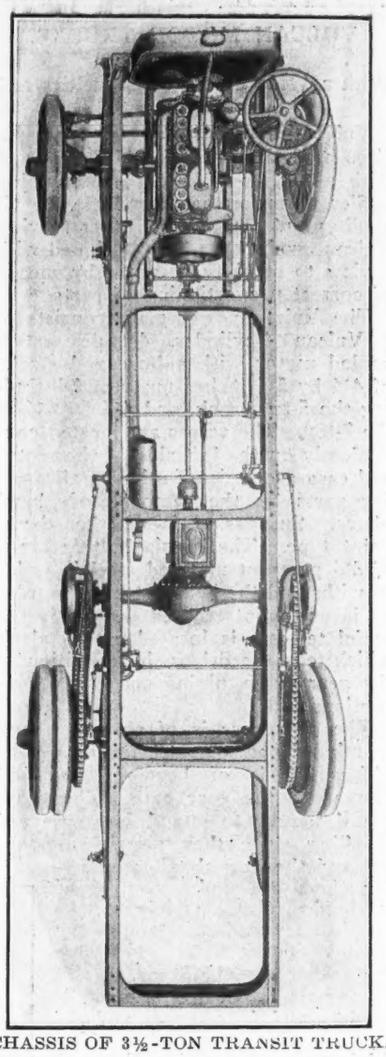
A new grading machine is being patented which is claimed to cut through any material that may be handled with a steam shovel. The Dennis turbine traction grader and loader is built in 5, 6 and 7-foot widths and is designed to cut from 2 to 24 inches deep through macadam and old roadbeds, shale rock, hard pan, clay, gravel or any similar material. The capacity for loading into wagons or cars is claimed to be from 50 to 100 cubic feet per minute, depending on the grade of material and the facilities for receiving it from the elevator.

The machine consists essentially of a toothed cylinder for tearing and a slat conveyor for handling the material. The digging mechanism consists of a large hollow cylinder carried on roller bearings which is revolved by the motor. Both cylinder and elevator are carried on a heavy braced frame which is hinged to the frame of the traction part. The whole grading part may therefore be raised or lowered by means of a segment pinion and the digging depth thus controlled. To the cylinder are attached the rooters in such a way that a bucket is formed between the cylinder surface and the base of the rooters so that, as a set of rooters reaches the top, the material is dropped on the slats and carried out by the conveyor to one side. At intervals on the sides of the cylinder are side cutters which project so that no large piece of material may be dug up and allowed to enter the gearing at the side.

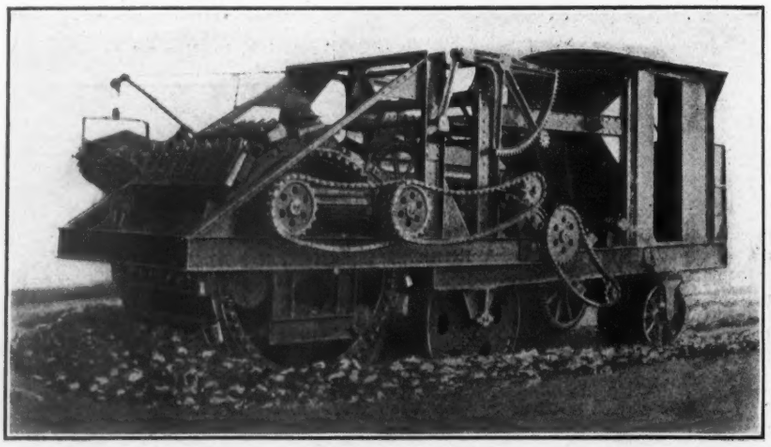
The conveyor consists of linked slats running on chain geared wheels, and it dumps the material off the end, either in a pile along the side or direct into wagons.

The traction is of the heavy motor truck type, consisting of a four-cylinder Wisconsin motor. The gears are all cast steel, as also the sprockets. The chains have hardened steel pins and steel side bars. The elevator consists of steel slats 3/16 inch thick and 2½ inches wide riveted to the carrier chain near each end. The rooters and side cutters are made from a special grade of selected steel which will withstand hard usage. The whole machine is operated from the cab, in which are grouped all levers within easy reach of the operator. These levers control the steering, vertical motion of the grading cylinder, digging speed and road speed of two to four miles an hour.

This grader and loader, illustrated here, is made by the Dennis Turbine Traction Grader & Loader Co., 543 36th street, Milwaukee, Wis.



CHASSIS OF 3½-TON TRANSIT TRUCK.



DENNIS TURBINE TRACTION GRADER AND LOADER.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago—In addition to small tonnage for Findlay, O., lettings are announced for 150 tons at Ashton, Ill., and 60 tons at Hammond, Ind. Quotations: 4-inch, $26; 6 to 12-inch, $24; 16-inch and up, $23.50. Birmingham—Fair volume of business. Quotations: 4-inch, $20; 6-inch and up, $18. New York—No public lettings in sight. Quotations: 6-inch, $20 to $20.50.

Lead.—Quotations: New York, $3.50; St. Louis, $3.375.

The American Well Works Co., Aurora, Ill., has delivered to the Amarillo Light and Water Co., Amarillo, Tex., an eight stage motor-driven centrifugal pump. The equipment will lift 160 gallons per minute to the surface, a height of 310 feet.

The Standard Asphalt & Rubber Co., of 208 S. La Salle street, Chicago, Ill., has just issued a revised edition of "The Asphalt Filler Book." "The Asphalt Filler Book" is well worthy of the careful perusal of anyone interested in the construction and maintenance of street improvement, as it treats on the matter of fillers for brick and wood block pavements in an intelligible and concise manner. The booklet is of 20 pages and cover, and well illustrated throughout. It will be sent free to all by addressing "Dept. A."

Fire Convention Exhibit.

Among the exhibitors at the recent New Orleans Convention of the International Association of Fire Engineers were the following:

G. A. Anderson Mfg. Co., Baltimore, Md.—"Anderson" combination straight-stream and spray nozzles; couplings and hydrant caps.

S. F. Bowser & Co., Inc., Fort Wayne, Ind.—Oil-handling devices, tanks, pumps and portable systems.

The Davis Sewing Machine Co., Dayton, O.—"Dayton" tri-car chemical apparatus.

Samuel Eastman & Co., Concord, N. H.—Eastman nozzles; two, three and four-way deluge sets; platforms for high-pressure streams; Siamese; hydrant gates.

Larkin Mfg. Co., Dayton, O.—Shut-off nozzles; hydrant relief valve.

The National Safety Device Co., Cleveland, O.—Morgan National Safety Hood for smoke and fume protection.

Never-Skid Mfg. Co., New York.—Chain-and-bar protecting device for tires.

New Departure Mfg. Co., Bristol, Conn.—Fire bells for all types of apparatus.

Oxweld Acetylene Co.—"Oxweld" metal cutting outfit for fire department use.

The Atlas Portland Cement Co., Philadelphia, Pa., has filed notice in Harrisburg of an increase of stock from $12,500,000 to $14,000,000 and an increase of debt from $5,000,000 to $9,000,000.

The B. F. Goodrich Co., Akron, O., recently entertained Ohio officials and legislators at their huge factories, showing them Goodrich Safety Tread Tires being made by the thousands, as well as miles of rubber belting, and molded rubber goods of every description. The Ohio officials were in Akron for their annual legislative reunion. State Auditor Victor Donahey, in going through the administrative division of the Goodrich offices, expressed admiration at the perfect business system used in keeping vast accounts. Among others who were Goodrich guests for the day were State Treasurer John Brennan, State Senators William A. Weygandt, F. Hillenkamp, C. J. Howard, D. F. Mooney, J. J. Wise, Culbertson J. Smith, and State Representatives A. Ross Read and Charles A. Orrison.

NEWS OF THE SOCIETIES

(Continued from Page 682)

Alabama Good Roads Association.

The eighteenth annual convention of the Alabama Good Roads Association was held at Montgomery, Oct. 21-22, and more than 300 delegates were present. The program was included:

Reports of delegates from counties, cities, good roads, farmers, commercial and civic organizations.

"Good Roads and Women's Interest in the Same"—Address by Mrs. Nora E. Miller, Dadeville.

"Co-operation and Observance of Good Roads Days"—Address by W. F. Fitts, president Tuscaloosa County Good Roads Association.

"Good Roads from the Viewpoint of the Rural Mail Carrier"—Address by S. A. Reynolds, secretary of Alabama Rural Letter Carriers' Association, followed by F. B. Skipper, chairman of the executive committee of same association.

"Good Roads from the Viewpoint of the Farmer"—Address by O. P. Ford, president of the Farmers' Union, followed by W. A. Morris of Fayette County.

"Good Roads and Immigration"—Address by Mr. V. Richards, land and industrial agent Southern Railway.

"Trees on the Public Road"—Address by F. A. Gulledge.

"Convicts on the Public Roads"—Address by John W. O'Neill, first vice-president of Alabama Good Roads Association.

Report of Progress of State Highways—Hon. R. E. Spraggins, president Alabama State Highway Commission.

In the evening: Address by Gov.-elect Charles Henderson.

"Systematizing Highway Building"—Address by A. E. Ausman of Ohio.

"Uniform Good Roads Legislation for Counties in the Construction of Roads"—Address by G. N. Mitcham.

"Federal Aid for Good Roads"—Address by Senator John H. Bankhead.

At the closing session there were:

Addresses on federal good roads legislation by Thomas J. Heflin, Congressman Fifth Alabama district, followed by W. C. Oliver, Congressman-elect Sixth Alabama district.

Stereopticon views of the state highways and the split log drag explained, by W. S. Keller, state highway engineer.

League of Kansas Municipalities.

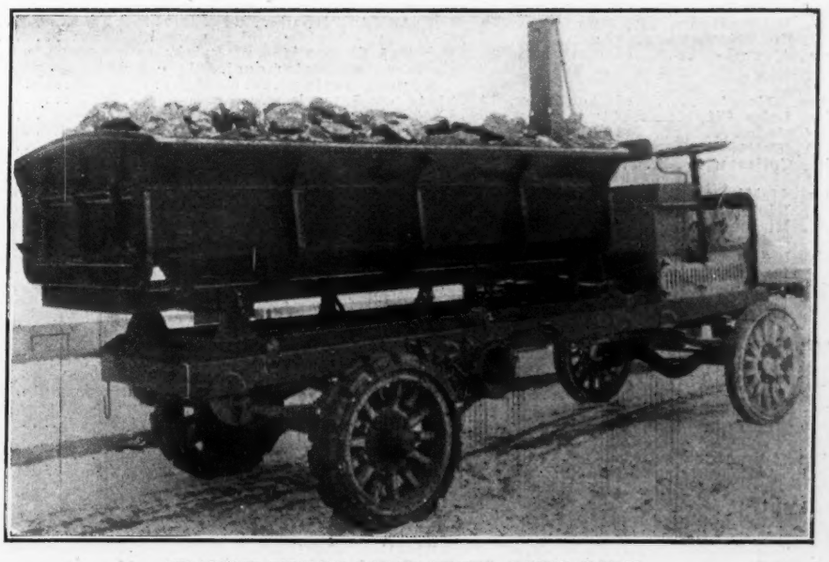
A total registration of 114 was reached at the sixth annual convention of the League of Kansas Municipalities held at Lawrence Oct. 7-9. Hutchinson was selected for the convention next year. The following officers were elected: C. W. Green, of Kansas City, is president; C. H. Karr, Independence, vice-president, and C. H. Talbot, Lawrence, secretary-treasurer, will direct the league through the coming year. The new board of trustees is composed of J. J. Varner, Iola; J. M. Plat, Junction City, and C. A. Banker, Salina.

Electric Vehicle Association of America.

Storage battery trucks have gone far toward solving the problem of cutting the costs of handling merchandise and bulk material on steamship piers and at freight terminals and warehouses, according to Stephen G. Thompson, who discussed the subject at the closing session of the convention held at Philadelphia.

T. H. Schoepf, in his address upon "Effects from the Utilization of the Kinetic Energy of an Electric Vehicle," said that he has succeeded in recharging the battery of an electric car while it was in motion to such an extent that there was a 20 per cent increase in the mileage.

Officers were elected as follows: John F. Gilchrist, of Chicago, president; Walter H. Johnson, this city, vice-president; H. H. Edwards, New York, treasurer; Frank W. Smith, New York; Charles Blizard, Philadelphia; E. P. Chalfont, Chicago, and J. H. McGraw, New York, directors.



TRANSIT TRUCK WITH STEEL DUMP BODY.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL		NATURE OF WORK	ADDRESS INQUIRIES TO
				STREETS AND ROADS.	
O.,	Cincinnati	Noon, Nov.	6.	100,000 No. 2 granite paving block	E. Von Bargen, City Pur. Agt.
Cal.,	Fresno	Nov.	6.	Improving road; cost, $6,800	Edward Frisse, Clk.
O.,	Wapakoneta	Nov.	6.	Paving several streets	Henry Moser, Dir. P. S.
Kan.,	Hutchinson	Nov.	6.	Paving with asphalt	City Commission.
N. J.,	Trenton	11 a.m., Nov.	6.	Road repair contract B, C, D, E and F	State Com. Pub. Roads.
O.,	Cincinnati	Noon, Nov.	6.	Improvement of Miles Road	Co. Comrs.
O.,	Cincinnati	Nov.	6.	Improvement of Miles and North Bend road	Board Co. Com.
Pa.,	Dormont	8 p.m., Nov.	6.	Grading	Douglass & McKnight, Boro. Engrs., 1709 Union Bank Bldg., Pittsburgh, Pa.
O.,	Zanesville	noon, Nov.	6.	Grading and repaving street	Director Public Service.
Va.,	Richmond	Noon, Nov.	6.	Arch under Broad Street	C. E. Bolling, City Engr.
Ind.,	Indianapolis	10 a.m., Nov.	6.	Grading and paving various streets	Board Public Works.
O.,	Cincinnati	Nov.	6.	100,000 granite paving blocks	City Pur. Agent.
Pa.,	Dormont	8 p.m., Nov.	6.	900 cu. yds. grading	Clerk of Council.
Pa.,	Uniontown	Noon, Nov.	7.	Constructing brick road and Tarvia bound macadam road and furnishing 325,000 paving bricks	Fayette Co. Cont.
Pa.,	Connellsville	noon, Nov.	7.	One mile brick road, ½ mile macadam road, 345,000 paving brick	T. H. Hudson, Co. Solic.
O.,	Springfield	Noon, Nov.	7.	Improvement of street	C. A. Ashburner, City Mgr.
O.,	East Youngstown	Noon, Nov.	9.	Grading and guttering, also paving	C. R. Anderson, Vil. Clk.
Ill.,	Kankakee	2 p.m., Nov.	9.	4¼ miles of hard road	Geo. Keller, Supt. Highways.
O.,	Defiance	2 p.m., Nov.	9.	Grading and macadamizing road	Comrs. Defiance County.
Pa.,	Cementon	5 p.m., Nov.	9.	Grading and paving street	C. J. McNally, Twp. Clk.
Cal.,	Sacramento	2 p.m., Nov.	9.	Construction of various state highways	Cal. Highway Commission.
O.,	Youngstown	Noon, Nov.	9.	Paving and grading several streets	C. R. Anderson, Clk.
Pa.,	Allentown	5 p.m., Nov.	9.	1,500 feet paving	Bascom & Seiger, Twp. Engrs.
O.,	Cleveland	Noon, Nov.	9.	Construction of walks and drives at three schools	Director of Schools.
N. J.,	Newton	Nov.	9.	Five miles of macadam road	W. Iliff, Dir. Bd. Freeholders.
Cal.,	Glendora	Nov.	9.	1,270 ft. curb, 5,600 sq. ft. gutter, 6,900 sq. ft. walk and 26,000 sq. ft. macadam	Board of Trustees.
Cal.,	Sacramento	Nov.	9.	39 miles state highway	State Highway Commission.
N. D.,	Manning	Noon, Nov.	9.	Grading	T. L. Evans, Aud., Dunn Co.
O.,	E. Youngstown	Noon, Nov.	9.	Paving, grading and guttering, three jobs	C. R. Anderson, Vil. Clk.
Tex.,	San Angelo	2 p.m., Nov.	9.	2,000 sq. yds. bituminous macadam	J. B. Keating, Clk. Tom Greene Co.
Mo.,	St. Louis	Noon, Nov.	10.	Grading	Board Public Service.
N. Y.,	S. I., New Brighton	Nov.	10.	Paving with concrete and granite block	Borough President.
Mo.,	St. Louis	Nov.	10.	Paving with vitrified brick	Board Public Service.
Pa.,	Pittsburgh	10 a.m., Nov.	10.	2,400 ft. of brick paving in Jefferson County	State Highway Commission.
Pa.,	Beaver	Nov.	10.	Construction of highway	State Highway Dept.
D. C.,	Washington	2 p.m., Nov.	10.	Grading road at Hygienic Laboratory	O. Wenderoth, Supv. Arch.
Pa.,	Harrisburg	10 a.m., Nov.	10.	Paving road with asphaltic concrete, brick block and bituminous macadam	E. M. Bigelow, State Hwy. Comr.
Fla.,	Fernandino	10 a.m., Nov.	11.	6,000 yds. oyster shells	J. W. Keen, Chr. Bd. Co. Com.
N. J.,	Camden	Nov.	11.	Improving highways	John Prentice, Dir
N. Y.,	Brooklyn	11 a.m., Nov.	11.	14,000 yds. granite block paving, 1,000 bbls. cement	L. H. Pounds, Boro. Pres.
N. J.,	Camden	10 a.m., Nov.	11.	50,000 sq. yds. road surfacing	County Road Committee.
Ind.,	Brownstown	1 p.m., Nov.	12.	County Line Road	A. Leudtke, Co. Aud.
Ind.,	Ft. Wayne	10 a.m., Nov.	12.	Grading, draining and paving highway	Comrs. Allen County.
Tex.,	Temple	10 a.m., Nov.	13.	Vertical fibre wire-cut brick; one course concrete; two-course concrete; asphaltic concrete or any other permanent paving	E. A. Kingsley, Engr., Temple.
Minn.,	Morris	10 a.m., Nov.	14.	State road work	F. E. Ware, Aud.
Fla.,	Lake City	Nov.	16.	2,600 yds. vitrified brick paving	J. W. Lane, Secy.
O.,	Toledo	10 a.m., Nov.	17.	Concrete driveway	Chas. A. Sanzenbacher, Aud.
S. D.,	Bellefourche	Nov.	17.	5,234 yds. road grading and construction	F. E. Bennett, Co. Aud.
Ala.,	Cullman	Nov.	17.	Grading, draining and surfacing with chert and slag, 1½ miles	City Clerk.
Tex.,	McKinney	noon, Nov.	18.	7.6 miles of highway, also bridges and culverts	P. Creager, Engr., Celina, Kan.
Ind.,	Richmond	11 a.m., Nov.	21.	Highway in Wayne County	L. S. Bowman, Aud.
Ind.,	Richmond	11 a.m., Nov.	21.	Grading, draining and surfacing road	Comrs. Wayne Co.
Ind.,	Indianapolis	10 a.m., Nov.	23.	Surfacing road	Comrs. Marion Co.
Ind.,	Indianapolis	10 a.m., Nov.	23.	Gravel road construction	W. T. Patten, Aud.
Pa.,	Harrisburg	10 a.m., Nov.	24.	20,158 lin. ft. of brick road	State Highway Com.
Mich.,	St. Joseph	Dec.	1.	Construction of 32 miles of road	Berrien Co. Comrs.
				SEWERAGE.	
Ind.,	East Chicago	11 a.m., Nov.	6.	Sewer system on two streets	T. Y. Richards, City Clk.
N. Y.,	Brooklyn	11 a.m., Nov.	6.	Constructing sewers, $13,500	L. H. Pounds, Boro. Pres.
Pa.,	Philadelphia	Nov.	6.	Collection of ashes and household waste	G. L. Cook, Dir.
Kan.,	Hutchinson	Nov.	6.	1½ miles of sewer main and sewage pumping plant	City Clerk.
Kan.,	Independence	Nov.	7.	Seven blocks concrete and brick storm sewers	G. H. Krienhagen, Clk.
Okla.,	Lawton	2 p.m., Nov.	7.	Storm water sewer system	Dept. of Interior, Washington, B. Sweeney, Asst. Secy.
Okla.,	Okmulgee	Nov.	9.	Construction of an incinerator and garbage disposal plant	Comrs. of Finance.
N. J.,	Asbury Park	8 p.m., Nov.	9.	Furnishing materials and laying 375 ft. 8-inch vitrified salt-glazed sewer pipe	H. L. Baumgartner, City Engr.
O.,	Canton	Nov.	9.	Storm sewer	City Council.
Tex.,	San Antonio	Nov.	9.	Street sweeping machines	City Purchasing Agent.
Minn.,	Marshall	9 a.m., Nov.	9.	Digging and constructing ditch	D. S. Shepard, Aud.
Cal.,	San Diego	10.30 a.m., Nov.	9.	Filtration plant	O. M. Schmidt, Sup.
O.,	Findlay	Noon, Nov.	10.	Combined sanitary and storm water sewer	J. Page, Twn. Clk.
Ind.,	Michigan City	10 a.m., Nov.	10.	Sewer construction	Board Public Works.
Ind.,	Peru	7.30 p.m., Nov.	10.	Sewer extensions	Pleasant Bell, City Clk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind.,	South Bend	10 a.m., Nov. 10.	Pipe sewers	Department Public Works.
La.,	Iberville Parish	Nov. 10.	Sewage disposal system with septic tank	Board of Control.
Minn.,	Tracy	8 p.m., Nov. 10.	6,000 ft. of sewer, 17 manholes, 1 lamphole	E. M. Campbell, City Rec.
O.,	Geneva	10 a.m., Nov. 10.	Construction of ditches	R. N. Case, Co. Surv.
La.,	Clinton	8 p.m., Nov. 10.	Sanitary and storm sewers	F. W. Leedham, City Clk.
Tex,	Dallas	2 p.m., Nov. 11.	Construction of sewage disposal plant	Board City Comrs.
O.,	Canton	Noon, Nov. 11.	Construction of new sewage disposal plant, and laying three sections of main sewer	G. H. Wynn, Res. Engr.
Minn.,	Blue Earth	10.30 a.m., Nov. 11.	Sewer construction, cost about $103,000	J. L. Herring, Aud. Faribault Co.
N. Y.,	Utica	2.30 p.m., Nov. 11.	Garbage disposal	Board Contract & Supply.
Ia.,	Clarion	2 p.m., Nov. 12.	Drain construction	F. E. Osier, Aud. Wright Co.
O.,	East Youngstown	Noon, Nov. 13.	Sewering two streets	C. R. Anderson, Vil. Clk.
Wis.,	Oconomowoc	Noon, Nov. 14.	Sanitary sewers	Board Public Works.
La.,	New Orleans	Noon, Nov. 14.	Sewer and water connections	Sewerage and Water Board.
Ill.,	Chicago	Noon, Nov. 14.	Sewer and water extensions	Sewerage & Water Board
La.,	New Orleans	Noon, Nov. 14.	Sewer extensions, water extensions, connections to sewers and water mains, etc	F. S. Shields, Sec. Sew. & Water Board.
O.,	Conneaut	Noon, Nov. 14.	Sewerage system and sewage treatment plant	City Engineer.
Ia.,	Iowa Falls	Nov. 15.	Sewer and water extensions, $20,000	J. H. Farrington, City Engr.
N. J.,	Camden	8 p.m., Nov. 16.	Sewers in several streets	Joshua C. Haines, Chr. Committee on Sts. & Highways.
Ind.,	Kokomo	10 a.m., Nov. 16.	Vitrified tile sewer	Board Public Works.
Neb.	Mitchell	6 p.m., Nov. 17.	Lateral sewer	Village Clerk.
N. J.,	Manasquan	Nov. 17.	Water and sewer system	R. D. Bush, Boro. Clk.
S. C.,	Allendale	Nov. 18.	Complete system of sanitary sewers, electric plant and water works	W. F. Googe, Chr. Com. P. W.
N. J.,	Camden	Nov. 20.	Construction of sewers	City Clerk.
N. J.,	Hackensack	Dec. 7.	Sanitary sewer system, disposal plant and pumping station	City Commission.

WATER SUPPLY

La.,	Houma	Nov. 6.	Direct-connected centrifugal pumps, 200 gallons capacity	Mayor.
La.,	Houma	Nov. 6.	Electrical and pumping equipment	Mayor.
Wyo.,	Medicine Bow	Nov. 7.	Constructing water works system	Town Council.
Ill.,	Chicago	11 a.m., Nov. 7.	Four bilge pumps	L. E. McGann, Comr. P. S.
N. J.,	Overbrook	Nov. 8.	Water works system	Village Clerk.
Ill.,	Chicago	11 a.m., Nov. 10.	Two 2,000,000-gallon motor-driven centrifugal pumps	L. E. McGann, Comr. P. S.
La.,	New Orleans	Noon, Nov. 10.	Water supply and sewerage system, boilers, engines and pumps	Bd. Control, New Court House Bldg.
La.,	Iberville Parish	Nov, 10.	Water supply system	Board of Control.
N. Y.,	New York	11 a.m., Nov. 10.	Construction of Moodna siphon	Catskill Water Supply.
Ill.,	Oglesby	Nov. 12.	Artesian wells, 1,650 feet deep	J. Corgiat, City Clk.
O.,	Springfield	Noon, Nov. 13.	300 tons c.-i. pipe, 30 fire hydrants, 55 gate valves, 1,000 curb boxes, and 20 tons of lead	C. E. Ashburner, City Mgr.
Wis.,	Oconomowoc	Noon, Nov. 14.	30 tons c.-i. water pipe	C. H. Scheenike, City Clk.
La.,	West Monroe	Nov. 14.	Enlargement of water and light plant	N. G. Tippit, Mayor.
La.,	New Orleans	Nov. 14.	Water main and sewer extensions	Sewerage & Water Board.
O.,	Wyoming	noon, Nov. 15.	Water works improvements	H. E. Bienfang, Secy.
Ill.,	Oglesby	Nov. 16.	Artesian well 1650 feet deep	City Clerk.
Ill.,	Hinsdale	Nov. 16.	Installation of water softening plant	Village Board.
O.,	Springfield	4 p.m., Nov. 16.	Installation of deep well pump	Building Comn. for Infirmary Bldg. in Clark County.
O.,	Springfield	4 p.m., Nov. 16.	Deep wells and compression tanks	J. M. Pierce, Co. Aud.
Okla.,	Morris	6 p.m., Nov. 16.	Water works system	Board of Trustees.
Ga.,	Columbus	3 p.m., Nov. 17.	Constructing water system	Board Water Comrs.
Md.,	Baltimore	Nov. 18.	Heating system for filtration plant and pumping station	Board of Awards.
S. C.,	Allendale	Noon, Nov. 18.	13,500 ft. 6-in. and 8-in. c.-i. pipe, 35 fire hydrants, 42 gate valves, 100,000 gal. tank and tower, pumping plant, reservoir, etc.	J. Googe, Clk. Pub. Wks.
S. C.,	Allendale	Nov. 18.	Sewers, water works and electric light systems	Comr. of Pub. Works.
La.,	New Orleans	Noon, Dec. 1.	150,000 lbs. of 5-ft. and 12-ft. riveted steel pipe	J. S. Shield, Secy.
Cal.,	San Francisco	Dec. 1.	Construction of 2,000,000 gallon reservoir	Water Comr.
Greece,	Athens	1915, Mar. 30.	Water supply for Athens and additional cities, estimated cost, $14,000,000	Bur. of Foreign & Domestic Commerce, Wash., D. C.

LIGHTING AND POWER

N. J.,	Newark	4 p.m., Nov. 6.	Furnishing electric lights for bridges	Richard F. Mattia, Chr.
O.,	Toledo	10 a.m., Nov. 6.	Heating and lighting plant at Children's Home	C. J. Sanzenbacher, Co. Aud.
O.,	Toledo	Nov. 6.	Construction of power house and equipment for power plant	Board Co. Comrs.
Ill.,	Collinsville	Nov. 6.	Lighting and fixtures for post office	O. Wenderoth, Wash., D. C.
Minn.,	St. Paul	10 a.m., Nov. 9.	Street lighting, gas and electric	August Hohenstein, Pur. Agt.
O.,	Salem	Noon, Nov. 9.	Electric current for street lighting	I. N. Russell, Dir. P. S.
La.,	New Orleans	Noon, Nov. 10.	Electric lighting, water supply and sewers	J. J. Prowell, Pres. La. Leper Home.
Ill.,	Canton	Nov. 10.	Lighting and fixtures for post office	O. Wenderoth, Wash., D. C.
Ind.,	Ft. Wayne	2 p.m., Nov. 10.	Incandescent lamps	Board Public Works.
Wash.,	Seattle	10 a.m., Nov. 13.	Supply of distribution transformers for one year	C. B. Bagley, Sec. B. P. W.
N. Y.,	Bath	11 a.m., Nov. 17.	Electric elevators	J. A. Golden, Soldiers' & Sailors' Home.
Ind.,	Indianapolis	Nov. 17.	Lighting parks, boulevards and bridges	Bd. of Park Comrs.
Tenn.,	Fayetteville	Nov. 19.	Lighting fixtures for post office	O. Wenderoth, Wash., D. C.
D. C.,	Washington	Nov. 19.	Steel rolling crest for dam	U. S. Reclamation Service.

FIRE EQUIPMENT

Pa.,	Philadelphia	Noon, Nov. 6.	Repairs to fire and police station	G. D. Porter, Director.
N. J.,	Paterson	8 p.m., Nov. 6.	3,000 ft. of 2½-inch hose	Bd. of Fire & Police Comrs.
Pa.,	Etna	5 p.m., Nov. 9.	500 ft. of fire hose, 500 ft. of 2-inch street hose	J. C. Armstrong, Boro. Clk.
O.,	Middletown	Noon, Nov. 9.	Extensions to fire house	City Commission.
Pa.,	Etna	5 p.m., Nov. 9.	500 ft. fire hose	J. C. Armstrong, Boro. Clk.
Pa.,	Luzerne	7 p.m., Nov. 10.	Combination hose and chemical, motor-driven	R. J. Blair, Boro. Secy.
N. Y.,	Syracuse	Nov. 11.	Engine house	Board Contract & Supply.
N. Y.,	Binghamton	Nov. 14.	Fire station, $14,000	Board Contract & Supply.
Ore.,	Portland	2 p.m., Nov. 16.	One six-cylinder motor city service truck and one four-cylinder motor chemical engine	J. R. Wood, Pur. Agt.
Tex.,	Sherman	7.30 p.m., Nov. 16.	1,000 ft. 2½-inch cotton hose	Hy. Zimmerman, City Secy.
Cal.,	Mare Island	10 a.m., Nov. 17.	Furnishing fire and air hose for Navy Yard	Navy Pay Off., San Francisco.
N. J.,	Orange	Nov. 17.	Motor fire equipment	City Commission.

BRIDGES

Cal.,	Fresno	Nov. 6.	75-foot bridge	Board of Supervisors.
N. Y.,	Schuylersville	4 p.m., Nov. 6.	Substructure and superstructure	J. J. Keefe, Town Supt., Saratoga.
O.,	Dayton	10 a.m., Nov. 6.	Materials and labor for construction of a 6-span steel bridge	W. H. Aszling, Secy.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL		NATURE OF WORK	ADDRESS INQUIRIES TO
Okla.,	Walter	2 p.m., Nov.	7..	Bridge construction	Comrs. Cotton County.
Kan.,	Lincoln	Noon, Nov.	7..	Four bridges from 20 to 32 feet long	C. E. Booze, Clk.
Ark.,	Batesville	2 p.m., Nov.	7..	Two highway bridges	J. W. Scott, Judge.
Miss.,	Vicksburg	Nov.	8..	Steel and concrete bridge, to cost $18,000	Comrs. Warren and Hinds Co.
Ia.,	Muscatine	1 p.m., Nov.	9..	Construction of a pony truss bridge	J. J. Ryan, Co. Engr.
Kan.,	Wichita	Noon, Nov.	9..	Reinforced concrete bridge consisting of six 35-ft. spans, estimated cost $15,000	W. J. McLean, City Clk.
Ida.,	Nampa	2 p.m., Nov.	9..	Removal of old bridge and erection of new	G. H. Moore, Secy.
N. Y.,	New York	Nov.	10..	Repairing, cleaning and repainting bridge	Pres. Boro. Bronx.
Pa.,	New Castle	2 p.m., Nov.	10..	Building bridge over Chanango River	S. B. Rambo, Supt.
S. D.,	Armour	Nov.	10..	Corrugated iron or steel culverts	C. F. Meyer, Co. Aud.
N. D.,	Minot	Nov.	10..	Bridge over Mouse river	Co. Auditor.
S. D.,	Britton	1 p.m., Nov.	10..	Bridges and culverts	Comrs. Marshall Co.
S. D.,	Salem	2 p.m., Nov.	11..	Steel and reinforced concrete bridges	A. E. Ecklein, Aud.
Cal.,	Merced	Nov.	11..	Three concrete bridges	Co. Bd. Supv.
S. D.,	Rapid City	Noon, Nov.	11..	Bridges for 1915	Comrs. Pennington Co.
S. D.,	Alexandria	Nov.	11..	Bridges for 1915	W. A. Caldwell, Aud.
Ind.,	Columbus	Nov.	13..	200-foot single span bridge	County Comrs.
Va.,	Fort Monroe	2 p.m., Nov.	14..	Concrete foot bridge	Quartermaster.
Fla.,	St. Augustine	10 a.m., Nov.	15..	Concrete bridge	W. W. Snow, Clk. Circuit Ct.
Fla.,	St. Augustine	Nov.	16..	Concrete bridge	Board of Co. Comrs.
N. Y.,	White Plains	Nov.	16..	Concrete bridge	Wm. Mercer, Supt. Hwys.
S. D.,	Volga	Nov.	17..	County bridges	F. H. Ripley, Co. Aud.
S. D.,	Bellefourche	2 p.m., Nov.	17..	Wood and steel bridges	F. E. Bennett, Co. Aud.
D. C.,	Washington	2 p.m., Nov.	17..	Reinforced concrete arch bridge	Comrs. Dist. of Columbia.
Neb.,	Ord	Nov.	17..	Concrete girder bridge	Co. Clerk.
S. D.,	Castlewood	Nov.	18..	Bridge construction for 1915	Guy Osborne, Co. Aud.
Ind.,	Ft. Wayne	10 a.m., Nov.	19..	Construction of a bridge across St. Mary's River	County Commissioners.
Ind.,	Ft. Wayne	10 a.m., Nov.	19..	Bridge over St. Mary's River	County Comrs.
N. Y.,	Albany	noon, Nov.	20..	Bridge over canal	State Supt. Public Works.
S. D.,	Sioux Falls	Nov.	21..	Bridges for 1915	County Comrs.
La.,	Crowley	Nov.	28..	Two steel bridges and approach	Police Jury.
S. D.,	Elk Point	Dec.	24..	Bridge construction for 1915	Edward Holden, Co. Aud.

MISCELLANEOUS.

Ill.,	Edwardsville	2 p.m., Nov.	6..	Mail chute equipment	Harry Mackinaw, Clk.
Ky.,	Henderson	2 p.m., Nov.	7..	Repair work and painting	S. Trafton, Custodian.
Pa.,	Wilkes-Barre	Nov.	9..	Furnishing and erection of steel cells	City Clerk.
Okla.,	Okmulgee	Nov.	9..	Construction and equipment of incinerator and garbage disposal plant, capacity 5 tons for 24 hours	Comrs. of Finance.
O.,	Cleveland	Nov.	10..	Three-story school, reinforced concrete floors and brick wall construction; estimated cost, $200,000	Board of Education.
Ill.,	Canton	3 p.m., Nov.	10..	Construction of two-story post office	O. Wenderoth, Wash., D. C.
D. C.,	Washington	Nov.	10..	Various Supplies for Navy Department	Bur. of Supplies & Accounts.
Ill.,	Chicago	11 a.m., Nov.	11..	Cut stone	L. E. McGann, Comr. P. S.
Ore.,	Dalles	Nov.	12..	Federal building	Architect, Washington, D. C.
H. I.,	Pearl Harbor	11 a.m., Nov.	14..	One narrow gauge, saddle tank switching locomotive	H. R. Stanford, Bureau Yds. & Docks, Washington, D. C.
Va.,	Norfolk	Jan.	16..	150 ton capacity floating revolving crane; cost, about $450,000	Bur. Yds. & Docks, Navy Dept., Wash., D. C.
N. Y.,	Syracuse	3 p.m., Nov.	16..	Wiring and lighting system for Post Office	O. Wenderoth, Supt. Architect.
S. D.	Flandreau	1 p.m., Nov.	17..	Wood furniture for Court House	G. H. Chorpening, Aud.
Wash.,	Puget Sound	10 a.m., Nov.	17..	Garden hose	Navy Pay Office, Seattle.
N. Y.,	Lockport	8 p.m., Nov.	17..	Improvement of union school building	E. Belknap, Clk. Bd. Educat'n.
S. D.,	Flandreau	9 a.m., Nov.	18..	Metal furniture and light fixtures	G. H. Chorpening, Aud.
La.,	Baton Rouge	Noon, Nov.	18..	Altering and repairing public building	City Clerk.
O.,	Cincinnati	2 p.m., Nov.	19..	Reinforcing steel and metal lathing	Cap. R. V. Harner, Q. M.
W. Va.,	Charleston	10 a.m., Nov.	19..	Constructing a steel hull for dredge	Col. H. Jervey, Custom House.
D. C.,	Washington	noon, Nov.	21..	Two-story building 227 ft. long, for school of medicine	State Board of Control.
Okla.,	El Reno	2 p.m., Nov.	21..	Rewiring patent office	E. Sweeney, Asst. Secy.
D. C.,	Washington	Nov.	24..	Construction of Post Office	O. Wenderoth, Supt. Architect.
Wis.,	Sparta	3 p.m., Nov.	25..	Extending and remodeling Post Office at Detroit, Mich	Supervising Architect.
			30..	Construction of Post Office	O. Wenderoth, Sup. Architect, Washington, D. C.
Ill.,	Robinson	2 p.m., Dec.	4..	Construction of post office	Supervising Architect.
D. C.,	Washington	Dec.	5..	Post Office at Morristown, N. J.	Supervising Architect.
N. Y.,	Glens Falls	3 p.m., Dec.	17..	Construction of post office	Supervising Architect.

STREETS AND ROADS

Montgomery, Ala.—R. P. Boyd, Assistant State Highway Engineer, has let contract for construction of state-aid road in Randolph County. Road will be six miles long, will be graded and will cost approximately $8,000.

Fort Smith, Ark.—County Judge Hester will recommend $5,000 to be spent on Upper Township road and $5,000 to be spent on the three main roads, Greenwood, Little Rock and Hackett City.

Globe, Ariz.—Resolution ordering sidewalks on north side of Maple street from Hill to Third streets and to Harrington lots on south side has been adopted. A resolution for sidewalk grade was ordered on First street between Cottonwood and Maple.

Tucson, Ariz.—Plans for construction of road into Catalina mountains will be discussed in Tucson. Mr. Selkirk, supervisor, is strongly in favor of road to summit of Catalinas and he prefers road from Oracle along Oracle ridge to Soldiers Camp, distance of 15 miles, as most feasible route. He estimates that this road would cost $50,000.

Tucson, Ariz.—Street Committee has been instructed to investigate and purchase street cleaning apparatus for use on paved streets, cost not to exceed $1,500, which amount was allowed for such purchase in city budget.

Berkeley, Cal.—In compliance with agreement reached between Berkeley and Key Route officials regarding paving of Grove St. City Council has passed modified paving ordinance requiring company to lay concrete girders under tracks on that street in place of solid concrete mattress ordered in ordinance, which Council refused to pass. Company will not be required to make permanent improvements immediately, it being agred that postponements will be allowed from time to time.

Lodi, Cal.—Lodi Chambers of Commerce is interesting itself in move to obtain appropriation of $15,000 from State to build six miles of road between Clements and the Mokelumne River, where Amador, Calaveras and San Joaquin Counties corner.

Sacramento, Cal.—Widening of 34th St. is being discussed.

San Francisco, Cal.—Board has ordered paving on Chestnut St. from Laguna to Webster, Beach between Hyde and Larkin, and Randall from Chenery to Southern Pacific track.

Stockton, Cal.—Resolution has been adopted for improvement of various streets. W. D. McAllen is superintendent of streets.

Stockton, Cal.—Sonoma county will vote on $1,600,000 bond issue for good roads on Nov. 3.

Hartford, Conn.—Appropriation of $3,500,000 is required for next two years for highway work, according to estimate of Highway Commissioner Charles J. Bennett.

Washington, D. C.—An American consul in Central America reports possible market for road machinery, stone crushers and steam rollors. No. 14,267, Bureau of Manufactures.

East St. Louis, Ill.—Women voters in St. Clair county will be permitted to vote on $14,000 good roads bond issue amendment at election Nov. 3. Proposition is for county to issue bonds in sum of $14,000 to be used for road improvement, and State will add a similar amount.

Fort Wayne, Ind.—Bids will be received for paving St. Mary's avenue from Breck to Burgess street. This will be last section of paving work to be let this fall.

Fort Wayne, Ind.—Bonds in sum of $16,000 and $4,800 for stone roads in Allen County will be sold by J. H. Bueter, Treasurer Allen County, at 10 a. m., Nov. 10.

Mishawaka, Ind.—Preliminary steps toward improvement of Union St. from 8th St. to city limits have been taken by Board of Public Works.

Vincennes, Ind.—Unless property owners object present indications are they will not do so, asphalt will be used in paving Fourth St. from one end of the city to other. Lowest bid on asphalt paving was $56,079.50 and highest $58,066.10. Lowest bid on brick paving was $51,722.

Burlington, Ia.—Petition is being considered for paving of South street from Summer street to Garfield avenue.

Clinton, Ia.—City Council has voted unanimously to widen sidewalks three feet on east side of Jefferson St. for three blocks in business section preparatory to installing boulevard lights.

Dubuque, Ia.—Resolutions have been adopted for various street improvements.

Lexington, Ky.—The McDowell speedway on north side of Richmond Rd. is to be resurfaced with sheet asphalt and new 40-ft. dirt speedway opened in middle of road.

Louisville, Ky.—Board of Public Works has opened bids for improvement of L street from Fifth to Sixth streets, and Clay from Main to Jefferson. Bituminous concrete is material to be used, and aggregate cost is estimated at $10,000. There were three bidders, the Hoke Company, the Louisville Asphalt Company and the Bickel Asphalt Paving Company. The latter concern submitted the lowest bid on each of two pieces of work.

Louisville, Ky.—Several miles of new granitoid pavements have been ordered.

Louisville, Ky.—Within a short time board will award contract for reconstruction of Hill street from Fourth to Sixth, bituminous concrete to be used in work. It will cost approximately $8,500. Intersection of Fifth and Walnut streets will be paved with wooden blocks at cost of $1,050.

Louisville, Ky.—Bids have been opened by Board of Public Works for improvement of L St., from Fifth to Sixth, and of Clay, from Main to Jefferson. The Bickel Asphalt Paving Co. underbid both Hoke Co. and Louisville Asphalt Co. on both pieces of work. Specifications call for use of bituminous concrete at aggregate cost of $10,000.

Ky.—Boone County will vote on issuance of $75,000 worth of bonds to build roads and bridges.

New Albany, Ky.—Several miles of granitoid pavements have been ordered by New Albany Board of Public Works, replacing probably all of the really bad pavement in the city.

Boston, Mass.—Of numerous street improvements authorized by mayor most important is that of Spring St. widening, from Gardner St. to Webster Ave. In long list of street improvements for completion before cold weather, if possible, damages were awarded in only a few cases. List includes the following-named streets: Percival St., Dorchester; Deering Rd., between Harvard St. and Blue Hill Ave.; Pelton St., West Roxbury, from Park St. to the West Roxbury parkway; Montebello Rd., from Washington St. to Walnut Ave., West Roxbury; Melvinside terrace, between Dorchester Ave. and Pleasant St.; Montebello Rd.,West Roxbury; Malcolm St., West Roxbury; Idlewild St., Brighton. Newbury St., from Massachusetts Ave. to Charlesgate East, will have new macadam surface at cost of $2,300; Queen St., Dorchester, will be supplied with bitulithic surface at cost of $2,053, and Barbara St. will be repaired at a cost of $1,619.

Lynn, Mass.—Board of Selectmen has decided to ask for bids again for contract to build Wyman and Bubier Rds., specifications for work having been changed once more. Bids are to be opened to non-resident as well as resident contractors. New specifications call for building of plain gravel roads, which will be sufficiently convenient for residents who now reside along two streets. Four times have bids been called for by Selectmen, but each time contract could not be awarded on account of bids being too high.

Flint, Mich.—Petition has been sent to Governor Lewis requesting that machinery of state be immediately set in motion to provide necessary funds and arrange logical program of state highway improvement.

St. Paul, Minn.—Fillmore Ave. will be paved with sandstone from Hyde St. to South Wabasha St. It will cost $8.83 a front foot, as compared with $7.31 for creosoted wood blocks, according to estimates of city engineer. Whole job is estimated to cost $16,257.93. Fairfield Ave., from Wabasha to Bell St., will be paved with same material. Job will cost $30,566, or $7.69 a front foot.

St. Joseph, Mo.—Ordinance has been passed for paving Isadore St. from 11th St. to Fink's addition with Bermudas asphaltic macadam, and for paving Penn St. from 29th to 30th Sts. with asphaltic concrete.

St. Joseph, Mo.—Ordinance has been adopted to provide for paving 11th St. from Frederick Ave. to alley north of Isadore St. with Bermudez asphalt macadam, resetting old curb, constructing new curb and concrete sidewalks and driveways therealong.

Atlantic City, N. J.—Construction of Absecon-Atlantic City Boulevard is being considered by Road Commissioner Stevens.

Albany, N. Y.—Lowest bids received by State Highway Commission at its office, No. 55 Lancaster St., Albany, N. Y., for construction of public highways by State aid on Oct. 30, 1914, are as follows: Road No. 5217-A, Jamestown-Bemis Point, Chautauqua Co., 6.82 miles, Lawrence Schultz, Fredonia, N. Y., $100,-198.60; Road No. 5245-A, Bemis Point-Dewittville, Chautauqua Co., 5.26 miles, Edward T. Beck & Co., Warren, Pa., $92,-103; Road No. 5263-A, Dewittville-Mayville, Chautauqua Co., 5.51 miles, Edward T. Beck & Co., Warren, Pa., $81,866; Road No. 520, Ellenville Depot-Franklin Co. Line, Clinton Co., 11.83 miles, Gruner & Hallenbeck, Harriman, N. Y., $104,431.50; Road No. 1212, Genesee St., Part 1, Erie Co., 5.40 miles, Thos. F. Shaughnessy, Albany, N. Y., $132,710; Road No. 1213, Genesee St., Part 2, Erie Co., 6.22 miles, Checktowaga Construction Corporation, Buffalo, N. Y., $89,853.50; Road No. 1214, Genesee St., Part 3, Erie Co., 5.90 miles, Thos. E. Shaughnessy, Albany, N. Y., $91,464.50; Road No. 1064, Tonawanda Creek-Hunt's Corners, Erie Co., 4.03 miles, Cold Spring Construction Co., Buffalo, N. Y., $53,080; Road No. 1067, Athol Springs-Hamburg, Erie Co., 4.08 miles, Louis H. Gipp, Buffalo, N. Y., $96,680; Road No. 1066, Orchard Park-East Aurora, Erie Co., 6.58 miles, Rich Construction Co., Inc., Holley, N. Y., $145,039.50; Road No. 1217, Oneida-Munnsville, Part 2, Madison Co., 3.19 miles, Paddleford & King, Sherburne, N. Y., $25,094.50; Road No. 1216, Chittenango-Lakeport, Part 1, Madison Co., 1.87 miles, Paddleford & King, Sherburne, N. Y., $15,613.30; Road No. 5522, Ionia-Mendon, Monroe Co., 3.97 miles, C. O. McComb, Syracuse, N. Y., $39,699; Road No. 5521, Verona-Rome, Oneida Co., 5.70 miles, J. G. Hayes, Hornell, N. Y., $58,221.25; Road No. 5278-A, West Sand Lake-Averill Park, Rensselaer Co., 3.66 miles, Gifford Construction Co., Jamaica, N. Y., $42,402; Road No. 1215, Central Bridge-Sloansville, Schoharie Co., 4.16 miles, Geo H. McAvoy, Creek Locks, N. Y., $30,666.50; Road No. 5286-A, Howes Cave-Cobleskill, Schoharie County, 0.62 miles, Wera & Gaspary, Albany, N. Y., $9,972; Road No. 986, Fosterdale-Mongaup Valley, Sullivan Co., 10.97 miles, Bridgeport Construction Co., Poughkeepsie, $101,-314.50; Road No. 5506, Port Dickinson-Village-North Chenango Co., Broome Co., 1.27 miles, Paddleford & King, Sherburne, N. Y., $58,528.60; Road No. 1145, Syracuse, City-Englewood Ave., Onondaga Co., 0.76 mile, Samuel Bonn, Syracuse, N. Y., $26,-733; Road No. 5524, Jordonville-Richfield Springs, Herkimer Co., 5.27 miles, Stanley Construction Co., Buffalo, N. Y., $47,533.

Niagara Falls, N. Y.—Council has approved of brick for paving Whirlpool street from Chasm to Chestnut avenues. The city engineer estimated cost of paving Michigan avenue from Fifteenth to Twenty-second streets will be $16,589.03.

Norwich, N. Y.—At regular meeting of common council Attorney W. K. Loomis presented petition signed by nearly 100 taxpayers asking that Fair street be extended through from Court to Broad street. Action was taken by council authorizing city engineer to prepare maps and estimates for proposed street.

Syracuse, N. Y.—Ordinances have been adopted designating asphalt as material for resurfacing pavement in East Genesee St. In each case 10-year guaranty is called.

Cincinnati, O.—Petition for improvement of Shepherd road, to join Colerain pike to West Ford road, has been referred to Surveyor Cowen for estimate.

Delaware, O.—County improved road bonds in sum of $144,400 will be sold in November. W. V. Aldrich is Co. Aud.

Steubenville, O.—Street improvement bonds in sum of $18,000 have been sold.

Youngstown, O.—Ordinance has been adopted for improvement of Evanston Ave. by paving.

Beaver, Pa.—Council has directed ordinance committee to prepare ordinance for paving of Canal street from Beaver street to Buffalo street.

Butler, Pa.—Baltimore & Ohio railroad has promised to help in improving Etna street.

Chester, Pa.—Ordinance has been passed providing for paving of roadways of 24th St., from Edgmont Ave. east to Crosby St., and 19th St., from Hyatt St. to Washington Boulevard, with asphalt, bitulithic, filbertine, warrenite, amiesite, wood block, vitrified brick or block, or any other improved, modern, hard and durable street paving material. John H. Mirkil is City Clerk.

Lebanon, Pa.—The paving petition which was circulated among property owners on Lehman St., between 4th and 8th Sts., has been signed by over 70 per cent. of owners and will be presented to Councils within the next few weeks.

Lewistown, Pa.—Town Council of the Borough of Lewistown have been authorized to borrow $22,500 for following purposes: For the extension, opening and putting to grade of Dorcas St., from Water St. to Kishacoquillas St., including the bridge over the feeder race, $9,-000; for the extension, opening and putting to grade of Spruce St. from Pannebaker Ave. to South Pine Road, $500; for the borough's share of the grading and paving of South Main St. from Monument Square to Green Ave., $7,000; for the borough's share of the grading and paving of Pannebaker Ave. from Spruce St. to Walnut St., $3,000; and for the payment of the temporary loan for the borough's share of the grading and paving of Shaw Ave. and Forsythe Sts., $3,-000. N. F. Gutshall is President of Council.

Philadelphia, Pa.—At meeting of Woodland Ave. Business Men's Association committee was appointed to further movement toward having Woodland Ave. from 55th to 71st Sts. repaved.

Williamsport, Pa.—Petition for paving of High street from Walnut to Hepburn streets is being circulated among property owners of Twelfth ward. It is receiving number of signatures. Petition is also in circulation asking for paving of High street from Walnut to Campbell streets.

Sioux Falls, S. D.—Resolution has been adopted to pave Minnesota avenue from north line of Fourth street to north line of third street in city of Sioux Falls. W. C. Leyse is city auditor.

Sioux Falls, S. D.—City Commission has passed resolution providing for paving of 21st St west from Phillips Ave. to Minnesota Ave. under plan that will eventually connect boulevard drives in southern part of city.

Webster, S. D.—Additional contracts have been awarded for road work throughout Dewey county. It is planned to make public highways among best in state.

Bristol, Tenn.—Planning to repair portions of State St., Commissioner Keller has suggested that city should purchase a car load of brick. It was decided to examine samples with view of purchasing the brick at once.

Knoxville, Tenn.—Improvements will be made on Morelia Ave. and Columbia Ave.

Dallas, Tex.—Contracts for 20,000 yards more of paving, the quality not yet decided upon, have yet to be let.

Temple, Tex.—Order has been passed by court that Engineer Kingsley prepare plans and specifications for improvement of streets in Temple to connect with county roads, work to be done with one of following materials: Vertical fibre wire-cut brick, one course concrete; two course concrete, or asphaltic concrete. Auditor was also instructed to advertise for bids upon receipt of plans, bids to be opened in Belton Nov. 13.

Temple, Tex.—City Council has rescinded its action of few weeks ago when gravel was recommended as material to be used in improving streets of Temple and passed resolution requesting Commissioners' Court to expend Temple's share of bond issue in permanent paving, plans and specifications to be approved later. This plan, as explained, is to construct concrete roads 18 ft. wide and 7 ins. thick with $140,-000 appropriated by court. This amount would build about 8 miles of road, according to estimates furnished. Concrete would be laid in middle of street and in dry weather dirt road on either side of concrete could be used while in wet weather vehicles could travel over hard surface.

Temple, Tex.—Property owners on N. 1st St. from city park to Downs Ave. have signed petition for concrete paving 50 ft. wide with curbs and gutters, and will apply for their credit of 84 cts. per front ft., as agreed upon by Commissioners' Court. Proposed paving will cover distance of three blocks. Following statement has been made by E. A. Kingsley, road engineer, regarding cost of various pavements: Curb and 35-in. concrete gutter, per lin. ft., 55 cts.; Portland cement concrete, 30-ft. street, per front ft. of property, each owner, $2.62; asphaltic concrete, 30-ft. street, per front ft. of property, each owner, $3.35; brick, 30-ft. street, per front ft. of property, each owner, $4.19. Allowance to be made from bond issue to apply on cost, gravel front ft., 84 cts. These estimates are based upon 30-ft. streets, with 24-in. concrete gutters and curbing. Estimates also include paving intersection, amounts being distributed through block in each case.

Norfolk, Va.—Committee has referred to Walter H. Taylor, Jr., assistant city engineer, for estimate and recommendations, resolution providing for paving with bituminous macadam Cooke Ave., as extended, between Highland Ave. and Calvert St. A petition asking for installation of gutters and curbing and paving of Bolton St., in Huntersville, has been referred to assistant city engineer for estimate. If recommended this improvement will be made from funds now in hand for benefit of Huntersville district.

Benwood, W. Va.—Paving of 18th St., between Marshall St. and Ashland Ave., and portion of High St. has been ordered started immediately by Council. Nineteen thousand bricks were ordered for work, and street commissioner will have force of men at work in very near future.

Niagara Falls, Ont., Can.—Park Board will meet in few days to award contracts on work of extending boulevard to Fort Erie. At same time Commissioners will discuss plan of Alderman Ward for decorative lighting system in River Rd.

CONTRACTS AWARDED.

Hamilton, Ala.—By County Comrs. for grading and draining about 50 miles of road to Boyd & Bradshaw, Birmingham, at about $1,500 per mile.

Phoenix, Ariz.—Contract for loading and hauling approximately 300 carloads of gravel for use on Glendale-Phoenix Rd. has been awarded to George Tisdale of Phoenix. Gravel will be shipped from Agua Fria river over Santa Fe and unloaded at this city and Glendale. Tisdale's bid was 98 cts. per cu. yd. for 6,000 yds. to be moved.

El Monte, Cal.—For improving about 23,000 lin. ft. of road to J. O. Stanford, Long Beach, at $15,000.

Santa Ana, Cal.—Max L. Hubermann was lowest bidder for paving section 3 of Talbert Rd. Hubermann's figure was $20,584.52. Engineer's estimate was $22,496.52. Section of road to be constructed is five miles in length and extends from Greenville west through Talbert to the Huntington Beach boulevard. Other bids were as follows: Brashear-Burns Co., Los Angeles, $21.969.83; Fred Hoffman, Long Beach, $23.009.90; Rice and Dutcher, Imperial, $25,807.79; Oscar Ford, Riverside, $26,415.10.

Sawtelle, Cal.—To George R. Curtiss, 552 North St. Louis St., Los Angeles, at $19,835 for improving 10th and Ohio Sts.

San Francisco, Cal.—By Board of Works for paving Van Ness Ave., between Bay and North Point Sts., to A. J. Raisch at $5,950.

Sacramento, Cal.—By State Highway Commission contracts for highway work as follows: Santa Barbara county, between Stony Creek and El Capital, 10.2 miles, to C. H. Hudson, Los Angeles, Cal., at $79.191; Kern county, from southerly boundary to Rose Station, to A. C. McClean Construction Co., San Francisco, Cal., at $68,004; Humboldt county, between Loleta and Beatrice, 4.3 miles, to Elsmore & Jacobs, Eureka, Cal., at $18,777; Humboldt county, from Shively to Jordan Creek, 3.7 miles, to William Crowley and T. E. Cloney, at $28,624; Imperial county, between Meyers Creek and Coyote Wells, about 6 miles to J. W. Calbock, San Diego, Cal., at $68,145; Alameda county, from easterly boundary to Altamont, about 5.9 miles, to Palmer & McBride, San Francisco, Cal., at $38,032.

Upland, Cal.—For improving San Antonio Ave. to Southern California Construction Co., Ocean Park, at $53,262.

Whittier, Cal.—For constructing about 100,000 sq. ft. of asphalt paving on Philadelphia St. to Fairchild-Gilmore-Wilton Co., 607 Pacific St., Los Angeles, Cal., at $14,800.

Canton, Ill.—By Illinois Highway Commission for building extensions on West Maple, West Locust and North Main Sts. to Carpenter Construction Co., of Cleveland, at $33,443.

Monticello, Ind.—Contract for Gustavus Fewell Road on border of Tippecanoe and White Counties has been let to Ben Oiler, of Battle Ground, for $12,300. Thirteen other bids were entered.

Dubuque, Ia.—Bids for improvement of Pear St., as follows: Bid of C. B. McNamara & Co., grading in total $841.50; combination curb and gutter, per lin. ft., 69 cts.; macadam, per sq. yd., 76 cts. Bid of Tibey Bros., grading in total $700; combination curb and gutter, per lin. ft., 69 cts.; macadam, per sq. yd., 74 cts. Contact was awaded to Tibey Bros., they being lowest bidders.

Oskaloosa, Ia.—For construction of one block of concrete base brick block pavement on F St. west to Burlington Construction Co. at $2.05 per sq. yd:

Lexington, Ky.—To Carey-Reed Company for improvement of West Main street from Broadway to west line of Jefferson street except that portion thereof described in Section 2 of this ordinance, by resurfacing roadway thereof with sheet asphalt paving, type A, with Trinidad Pitch Lake Asphalt and by construction of curb and gutter at the following prices: Asphalt pavement, type A, $1.30 per square yard. Henderstone, 50 cents per linear foot. Concrete, $4.80 per cubic yard. Limestone curb, 75 cents per linear foot. Brick gutters, $1.60 per square yard. Cement sidewalks, 15 cents per square foot. Resetting old curb, 15 cents per linear foot. Cement curb with steel protection radii, $1 per linear foot. Resetting manhole tops, $2.50 each. Manholes, new, $30 each. Resetting old catch basins, $2.50 each. Catch basins, new, $30 each. Flush tanks, $55 each. 5-Inch pipe, 50 cents per linear foot. 8-Inch pipe, 70 cents per linear foot. 10-Inch pipe, 80 cents per linear foot. 12-Inch pipe, 90 cents per linear foot. 15-Inch pipe, $1 per linear foot. 18-Inch pipe, $1.10 per linear foot. 24-Inch pipe, $2.00 per linear foot. 10-Inch ¼ bends, $1.50 each. 15-Inch ¼ bends, $1.75 each.

Lexington, Ky.—By Board of Commissioners for improvement of North Limestone street by resurfacing the roadway thereof with sheet asphalt paving, Type A, with Trinidad Pitch Lake Asphalt and by the construction of curb and gutter to Carey-Reed Company at following bid: Asphalt pavement, Type A, $1.30 per square yard. Headerstone 50 cents per linear foot. Limestone curb 75 cents per linear foot. Concrete $4.80 per cubic yard. Brick gutters $1.60 per square yard. Resetting old curb, 15 cents per linear foot. Cement curb with steel protection radii $1.00 per linear foot. Resetting manhole tops $2.50 each. Manholes, new, $30 each. Resetting old catch basins $2.50 each. Catch basins, new,$40 each. Flush tanks $55 each. Five-inch pipe 50 cents per linear foot. Eight-inch pipe 70 cents per linear foot.

Louisville, Ky.—Board of Public Works has awarded to Henry Bickel Company contract to reconstruct Ninth street, from Magazine to Madison. Granite cubes of a kind never used in Louisville before are to be employed in the work. It will cost approximately $10,500.

Jersey City, N. J.—By Board of Boulevard Commissioners of Hudson county for repairing section of Hudson county Blvd. to Uvalde Asphalt Co., 1 Broadway, New York, at $141,455.

Jersey City, N. J.—For repaving Virginia Ave. to Van Keuren Contracting Co., Prior St., Jersey City.

Linden, N. J.—Fred McGillvray has been awarded contract for laying sidewalks in west side of Linden Ave. by Borough Council. His bid was 68 cts. per lin. ft. for walks and 50 cts. per cu. yd. for filling. Only other bidder was the F. Leonard Stone Co., of Elizabeth, 71½ cts. per ft. for walk and 50 cts. for filling. About 1,500 ft. of bluestone walks, 4 ft. wide, will be laid.

Milburn, N. J.—For construction of 8,250 sq. yds. paving to Franklin Const. Co. at $1.60 per sq. yd. H. W. Heilman is Asst. Co. Engr.

Albany, N. Y.—By State Highway Commission for construction of public highways by State aid (bids opened Oct. 15): Road 5518, Caneadea-Fillmore-Hume, Allegany Co., 4.75 miles—Contract awarded to Kennedy Constr. Co., Albany, at $53,587. Road 1161, Lestershire Village, Main St., Broome Co., 0.38 miles—Contract awarded to C. D. Dean, Albany, at $24,789. Road 5243-B, Sanitaria Springs-Harpursville, Broome Co., 4.29 miles—Contract awarded to Lane Contr. Corpn., Meriden, Conn., at $22,880. Road 5243-A, Sanitaria Springs-Harpursville, Broome Co., 4.67 miles—Contract awarded to Jos. Walker Contr. Co., Albany, at $64,898. Road 806, South New Berlin-New Berlin, Pt. 2, Chenango Co., 5.63 miles—Contract awarded to Newport Constr. Co., Herkimer, at $94,629. Road 1075, Harford Mills-Dryden, Pt. 1. Cortland Co., 5.25 miles—Contract awarded to Richard Hopkins, Troy, at $45,449. Road 5472, Truxton-De Ruyter, Part 3, Cortland County, 2 11 miles. Contract awarded to Crowe & Walsh, Pittsfield, Mass., at $26,473. Road 822, Cadyville-Moffittsville, Clinton Co., 6.73 miles. Contract awarded to Richard Hopkins, Troy, at $64,195. Road 1037 A, Gowanda Village, Erie Co., 0.39 mile—Two bids received and rejected: Austin W. Simmons, Buffalo. $20,518: Fugate & Hutchison, Olean, $20,370. Road 985 A, Tupper Lake-Moody, Franklin Co., 0.92 mile—Contract awarded to John F. Lewis, Albany, $14,426. Road 618, Mecco-Cayuga Lake, Fulton Co., 9.26 miles—Contract awarded to Lane Constr. Corpn., Meriden, Conn., at $91,707. Road 5514, Wells, Speculator, Part 1, Hamilton Co., 6.98 miles—Contract awarded to Parker Hassan Paving Co., Worcester, Mass., at $101,310. Road 5513, Ilion Village, Otsego St., Herkimer Co., 0.90 mile—Contract awarded to Harry W. Roberts Co., Utica, at $45,352. Road 5411, West Creek, Herkimer Co., 0.09 mile—Contract awarded to Crowe & Walsh, Pittsfield, Mass., at $5,542. Road 472, Columbia-Mohawk, Herkimer Co., 6.15 miles—Contract awarded to State Highway Constr. Co., Beacon, at $63,838. Road 5515, De Ruyter Village, Cortland and Utica Sts., Madison Co., 0.81 mile—Contract awarded to Crowe & Walsh, Pittsfield, Mass., at $9,574. Road 1201, Huntington Town Line, Farmingdale, Part 2, Nassau Co., 0.61 mile—Contract awarded to David Falconer Cont. Co., Long Island City, at $6,822. Road 5445, Milford Cooperstown, Otsego Co., 7.75 miles—Contract awarded to Caranea Constr. Co., Troy, at $91,077. Road 1157, Durhamville-Rome, Oneida Co., 13.73 miles—Contract awarded to Jos. Walker Constr. Co., Albany, $121,161. Road 5516, Lafayette-Tully, Onondaga Co., 8.73 miles—Contract awarded to Dale Eng. Co., Utica, $127,626. Rd. 1200, Cohocton-Wayland, Part 2, Steuben Co., 3.38 miles—Contract awarded to Atlanta Constr. Co., Atlanta, at $40,099. Road 5253 B, Jasper-Addison, Steuben Co., 5.71 miles—Contract awarded to Kennedy Constr. Co., Albany, $23,764. Road 5510, Bloomingburg-Monticello, Part 1, Sullivan Co., 8.18 miles—Contract awarded to Henry McNamee, Eddyville, at $102,754. Road 5350, Bath Village, Steuben Co., 1.89 miles—Contract awarded to Jos. Walker Constr. Co., Albany, at $68,294. Road 1211, Waterloo Village, Seneca Co., 1.49 miles—Contract awarded to Patrick D. Conley, Ithaca, at $69,511. Road 1189, Enfield Falls—Enfield Center, Tompkins Co., 6.34 miles—Contract awarded to Wm. Hazzard, Trumansburg, at $60,941. Road 5364 A, Ossining-Croton River, Westchester Co., $1.68 miles—Contract awarded to Alex Rohan, Haverstraw, at $20,269. Road 1210, Penn Yan-Branchport, Part 1, Yates Co., 6 miles—Contract awarded to Chas. M. Kelley, Penn Yan, at $75,707.

Cincinnati, O.—For improving section of Gilbert Ave. to Kirchner Construction Co., 221 W. 9th St., at $31,673.

Cincinnati, O.—County Commissioners have let eleven contracts for repairs and improvements of pikes and bridges. Among them improvement of Boudinot avenue, for which John Nickoson's bid of $10,035 was accepted, and repair of Duck Creek road, for which R. E. Cash's bid of $16,376 was accepted.

Sandusky, O.—Several contracts for furnishing stone have been awarded to Wagner Quarries Co., of Sandusky, by County Commissioners. Louis Gildemeister was awarded contract for hauling and spreading 800 tons of stone for Strecker Road in Groton Township on his bid of $372. The Wagner Co. drew contract for furnishing this stone as well as 500 tons at $600 for Florence Township, 400 tons at $260 for Perkins Township and 800 tons at $720 for Berlin Township to be delivered f. o. b. at Florence Corners, Wilmer and Yale. The Butler Stone Co. will furnish 400 tons for $380 to be used in Vermilion Township road improvement and to be delivered at Ruggles.

Beaver, Pa.—By Beaver Council contract for paving portion of Taylor avenue to J. G. McGuire & Co., at approximately $3,173.

Harrisburg, Pa.—For constructing approximately 31,000 sq. yds. of sheet asphalt to Central Construction & Supply Co., Harrisburg. Other bidders were: Cleveland Trinidad Paving Co., Cleveland, O., and Stucker Bros. Construction Co., Harrisburg.

Kittanning, Pa.—Contract for paving of Hawthorne Ave. has been let by Borough Council to lowest bidder, who proved to be Mervin and Rhodes. They will excavate, fill and pave for $1.49 per sq. yd., Cowanshannock paving brick to be used. New curbing will be set for 50 cts. per lin. ft., and old curbing reset for 8 cts. per ft.

Philadelphia, Pa.—For paving section of Wayne Ave. with vitrified block to McNichol Paving & Construction Co., 1923 Cherry St., at $17,633.

Williamsport, Pa.—To Busch & Stewart contracts for paving of Church street with Paxton brick at their bid of $2 a square yard and Diamond square with Watsontown brick at their bid of $2.03 a square yard. B. H. Coryell was award-

ed contract for paving of West Third street between Pine and William streets at his bid of $1.93 a square yard. Mr. Coryell bid on Paxton brick.

Dallas, Tex.—The $20,000 contract for $3,000 feet of permanent pavement on University place, adjoining the Southern Methodist University, has been let to the Texas Bitulithic Company. Work now under way is to be finished in sixty days.

Norfolk, Va.—Only one bid has been submitted to Board of Control for paving and curbing Thetford St., from Westover Ave. to Armistead Bridge Rd., this proposal being made by Louis Lawson, Norfolk, Va., to whom contract was awarded. Under contract the 1,400 sq. yds. of paving will cost the city $1.55 per sq. yd., while the installation of gutters and curbing will cost 55 cts. per lin. ft.

Norfolk, Va.—Upon recommendation of Superintendent Smith Board of Control yesterday awarded to C. M. Bayne & Co. contract for furnishing the City Park with twelve barrels of Portland cement at cost to city of $1.56 per barrel.

Richmond, Va.—Work on a $150,000 contract for asphalt paving in Richmond will be commenced in few days by Central Construction and Suply Co., of Harrisburg, Pa.

Prosser, Wash.—For constructing Benton City Rd. to W. A. Morain, Kennewick, at $11,820.

Seattle, Wash.—By board of Public Works for paving alley, block 24, Denny-Fuheman Add. to L. Coluccio at $1,970.08. For grading West Morgan street to Henry Brice at $5,014.50 and for paving Densmore avenue to R. G. Stevenson at $2,415.45.

Niagara Falls, Ont., Can.—Executive of Niagara Falls Conservative Association has passed resolution recommending to Park Commissioners that W. J. Spencer of this city be awarded contract for work of extending boulevard to Fort Erie. Spencer's bid is said to be lowest of half a dozen submitted to Park Board. Contract is to be awarded in a few days.

Ottawa, Ont.—For constructing 32,976 sq. yds. of asphalt, 9,808 sq. ft. water table, 13,598 lin. ft. of gutter and 4,676 lin. ft. of curb and gutter to Ottawa Construction Co., Ottawa, at $85,892.

SEWERAGE

Etna, Cal.—At next regular meeting of Town Trustees they will advertise for bids on Etna sewer; $14,000 of $21,000 issue have been sold, and it is expected within next week all of bonds will be sold.

Pomona, Cal.—Reports from Los Angeles indicate that $10,000,000 will be needed for storm protection in Los Angeles county. Of this sum they expect State to contribute about $1,500,000, the National Government $2,000,000 and county of Los Angeles the remainder.

Sacramento, Cal.—Bids for construction of second unit of suburban sewer system, known as low-land sewer, will be asked by City Commission. This second unit will run up Riverside Rd. as far as system is to extend, then east towards Maple Park. City Engineer Miller is now preparing plans and specifications for the unit.

Jacksonville, Fla.—Sum of $12,500 has been asked for construction of sewers in various parts of city.

New Smyrna, Fla.—People of Smyrna will vote on question of issuing bonds for $63,000 for waterworks and sewers and funding present city indebtedness Jan. 12, 1915, and present indications are that bond issue will carry by a big majority. Of bond issue $12,000 is for sewers. Proposition is that city pay one-third cost of installing sewer system and property owners pay two-thirds. Plans have been prepared by J. B. McCrary Co. of Atlanta.

Ocala, Fla.—Bonds for sewerage, calling for expenditure of $100,000 have been voted.

Peoria, Ill.—The South Side sewer ordinance has been passed. The sewer district includes territory lying between river and Lincoln Ave. above Berrian St. Estimated cost is $234,556. It will furnish sewer facilities to large and rapidly growing section of city and population of some 20,000 people.

Indianapolis, Ind. — Construction of sewer in first alley west of West St. from Jones to Ray Sts. has been ordered.

Peru, Ind.—Plans for lateral sewer between Canal and Second streets from Lincoln to Smith streets have been approved.

Burlington, Ia.—City engineer has been instructed to prepare plat and schedule of Prospect Hill sewer and to present it to council for approval.

Oskaloosa, Ia.—Resolution has been adopted by City Council for construction of sewer on G Ave. from I St. to west line of Minneapolis & St. Louis Railroad right of way. The above sewer to be constructed with 8-in. vitrified clay sewer pipe, 4-in. vitrified clay sewer pipe house connections where needed, Portland cement mortar joints, manholes, lamp holes, Y branches, risers and all necessary appurtenances. T. H. Caslin is City Clerk.

Louisville, Ky.—Sewer work to cost approximately $4,900 will be started under supervision of Board of Public Works soon. One sewer is to be constructed in alley north of Chestnut street, from Garr's lane to a point 1,340 feet west, and another is to be built in Eastern Parkway, from Peter avenue to a point 1,000 feet northeast.

Lowell, Mass.—Orders for sewers in Stevens, Mount Washington and Wilder streets has been adopted. The Stevens street sewer will be 450 feet in length and estimated cost is $2,050. The Wilder street sewer will be 669 feet in length and estimated cost is $2,372. Estimated cost of Mount Washington street sewer is $468.

New Bedford, Mass.—Committee on Roads, Bridges and Sewers voted to recommend sewer in Charles St., from Brock Ave. easterly 468 ft., and to ask for appropriation of $500 to build the sewer.

St. Joseph, Mo.—Ordinance has been passed for constructing sewer in District 136.

Camden, N. J.—Ordinance has been passed authorizing construction of sewers, culverts or drains in and along Ferry Ave. from Charles St. to Mt. Ephraim Ave.; Green St. from Liberty St. to Mechanic St.; Harrison Ave. from 28th to 29th St., and on 29th St. from Harrison Ave. to Delaware River, 20th St. from Federal St. to Boyd St., and on Boyd St. from 20th St. to Westminster St.

Manasquan, N. J.—See "Water Supply."

Plainfield, N. J.—Plans for immediate financing of sewer and school improvements needed by city of Plainfield have been discussed at joint meeting of Common Council and Board of Education. Approximately $420,000 will be required, of which $320,000 is estimated cost of sewer improvements and $100,000 represents cost of new school building on Evergreen Ave.

Rahway, N. J.—Site has been purchased on Hayden St. as a site for proposed sewage disposal plant.

Huntington, L. I., N. Y.—Installation of sewerage system is urgently recommended.

Syracuse, N. Y.—Common Council has taken action for construction of proposed system of sanitary and storm water sewers in eastern part of 17th Ward. Plans have been prepared by City Engineer W. Thomas Wooley. Sewers will be built in two districts.

Tottenville, S. I., N. Y.—Construction of sewer on Hopping avenue is being discussed.

Salem, O.—Construction of intercepting sanitary sewer along Garfield Ave. has been ordered. Estimated cost, $3,474.05.

Springfield, O.—County Building Commission will meet to consider plans for sewage disposal plant at new infirmary. State requires that all institutions of this kind be provided with proper means of disposing of sewage.

Portland, Ore.—Five bids have been received by Council for construction of Long Ave. district sewer in Southeast Portland, that of Edward Sandeberg for $15,064 being lowest. Bids were referred to Commissioner Dieck, of Department of Public Works, for scrutiny.

Dickson City, Pa.—Construction of lateral sewer extensions has been approved of.

Erie, Pa.—Ordinance has been passed providing for construction of 9-in. diameter lateral tile sanitary sewer in 24th St. in city of Erie, Pa., extending from Plum St. west 600 ft., more or less, together with necessary house connections.

Erie, Pa.—Council will ask state board of health to grant city another extension of time, until Nov. 1, 1917, in which to construct intercepting sewer system here.

Gallitzin, Pa.—Permit has been issued for lateral sewer extensions.

Kulpmont Village, Pa.—Sewerage system will be installed.

Philadelphia, Pa.—Permit has been granted for lateral sewer extensions.

Punxsutawney, Pa.—Petition presented to State Health Department for installation of sewage lines in various parts of city has been held up pending corrections to maps submitted.

Sioux Falls, S. D.—Bids for construction of lateral sewers on following streets have been received from Fanebust Bros. as follows: First Ave., 12th St. to 15th St., $834.40; 10th St., Indiana Ave. to Cliff Ave., $701.60; Menlo Ave., 18th St. to 21st St., $682.80; Tenth Ave., 22d St. to 21st St., $186.60; Alley Block 17, J. L. Phillips addition, $642; 9th St., Grange Ave. to West Ave., $796.40.

Bristol, Tenn.—City of Bristol has signed contract with Southern railway for construction of sewer which city is contemplating laying along Southern railway right of way to carry sewage of Fairmount. Sewer will be laid along Southern right of way along 4th St. and near Ash. It will cost about $6,000.

Cleburne, Tex.—City authorities are getting up data through Kansas City experts to be used in putting in up-to-date sewer system. When it becomes necessary to vote on bond issue to put in new sewer system practically exact cost will be available.

Georgetown, Tex.—Expenditure of $20,000 is being considered by city for constructing sewers.

Tacoma, Wash.—Ordinance has been passed to authorize Commissioner of Public Works to advertise for bids and let contract for construction of storm water trunk sewer, with sub-sewer and branches, and all necessary manholes, inlets, boxes and connections with existing sewers, and to appropriate $7,644 for same. W. D. Nickens is City Clerk.

CONTRACT AWARDED.

Huntington Beach, Cal.—For constructing section of municipal sewer system to Joseph Chutuk, Los Angeles, at $11,723.

New Haven, Conn.—Contract for construction of sewer in Grace and Ridge Sts. has been awarded to Thomas L. Maher, New Haven, at following bid: 280 ft. 15-in. vit. pipe sewer at $2; 450 ft. of 12-in. vit. pipe at $1.85; 60 ft. of 10-in. vit. pipe culvert at 75 cts.; 3 catch basins at $90 each; 7 manholes at $60 each. Total bid, $2,127.50. For sewer on Maltby St. to Dwyer & Mannix, New Haven, Conn., at following bid: 300 ft. 12-in. vit. pipe sewer at $1.75 and 3 manholes at $60 each. Total $705. For sewer in Bailey St. to Thos. L. Maher at following bid: 470 ft. 15-in. vit. pipe sewer at $1.65; 440 ft. 12-in. v. p. sewer at $1.55; 150 ft. 10-in. v. p. culvert at 75 cts.; 5 catch basins at $95 each; 7 manholes at $55 each. Total, $2,430. For sewer in Clinton Ave. to Dwyer & Mannix at following bid: 310 ft. 18-in. v. p. sewer at $2.25; 400 ft. 15-in. v. p. sewer at $1.95; 80 ft. 12-in. v. p. sewer at $1.75; 100 ft. 10-in. v. p. culvert at 75 cts.; 3 catch basins at $95 each; 6 manholes at $60 each. Total, $2,337.50. Same contractor was also awarded contract for sewer in County St. at total bid of $2,288. Sheathing left in place, $20 per M. H. J. Kellogg is Asst. City Engr.

Waterbury, Conn.—By Board of Commissioners for construction of sewers in Fleming, Willow, Albion, Idylwood Ave. and South Leonard St. to Antonio Lambo at $5,368.85.

Miami, Fla.—For constructing approximately 18 miles of sanitary sewers, 8 in. to 24 in., from plans of B. H. Klyce, 52 Real Estate Bldg., to J. J. Quinn Co., Bedford, Ind., at $122,008. Other bids were as follows: Biscayne Const. Co., $132,706; Southern Asphalt & Const. Co. (2 bids), $153,929, $63,726; Bryan & Co., $162,381; Cement Stone & Tile Co., $168,913; W. J. Irwin & Sons, $171,676; W. D. Harvey & Co., portion of work, $91,726. Following are itemized bids of J. J. Quinn Co., Bedford, Ind.: 6-in. Sewer—12,000 ft. house connections, 50 cts; 1,800 ft. riser, 30 cts. 8-in. Sewer—10,518 ft. 4 ft. deep, 65 cts.; 24,425 ft. 4 to 6 ft. deep, 70 cts.; 22,758 ft. 6 to 8 ft. deep, 80 cts.; 13,077 ft. 8 to 10 ft. deep, $1; 3,620 ft. 10 to 12 ft. deep, $1.50; 124 ft. 12 to 14 ft. deep, $2; 50 ft. 14 to 16 ft. deep, $2. 10-in. Sewer—50 ft. 4 ft. deep, 75 cts.; 879 ft. 4 to 6 ft. deep, 85 cts.; 967 ft. 6 to 8 ft. deep, $1; 1,988 ft. 8 to 10 ft. deep, $1.25; 50 ft. 10 to 12 ft. deep, $2. 12-in. Sewer—600 ft. 4 ft. deep, 85 cts.; 300 ft. 4 to 6 ft. deep, 95 cts.; 1,175 ft. 6 to 8 ft. deep, $1.20; 1,817 ft. 8 to 10 ft. deep, $1.50;

1,575 ft. 10 to 12 ft. deep, $2; 375 ft. 12 to 14 ft. deep, $2.50; 10 ft. 14 to 16 ft. deep, $3; 10 ft. 16 to 18 ft. deep, $4. 18-in. Sewer—10 ft. 4 ft. deep, $1; 10 ft. 4 to 6 ft. deep, $1; 10 ft. 6 to 8 ft. deep, $1.50; 10 ft. 8 to 10 ft. deep, $2; 514 ft. 10 to 12 ft. deep, $2; 200 ft. 12 to 14 ft. deep, $2.50; 10 ft. 14 to 16 ft. deep, $3.50. 20-in. Sewer—10 ft. 4 ft. deep, $1.45; 10 ft. 4 to 6 ft. deep, $1.50; 10 ft. 6 to 8 ft. deep, $2; 10 ft. 8 to 10 ft. deep, $3; 787 ft. 10 to 12 ft. deep, $3; 10 ft. 12 to 14 ft. deep, $4. 22-in. Sewer—10 ft. 4 ft. deep, $1.75; 10 ft. 4 to 6 ft. deep, $2; 250 ft. 6 to 8 ft. deep, $2.50; 500 ft. 8 to 10 ft. deep, $3; 330 ft. 10 to 12 ft. deep, $4; 10 ft. 12 to 14 ft. deep, $4.50. 24-in. Sewer—10 ft. 4 ft. deep, $1.75; 10 ft. 4 to 6 ft. deep, $2; 1,230 ft. 6 to 8 ft. deep, $2.25; 3,550 ft. 8 to 10 ft. deep, $2.50; 1,650 ft. 10 to 12 ft. deep, $3; 300 ft. 12 to 14 ft. deep, $4. "Jointite" Joints—4,000 ft. 6-in. pipe, 5 cts.; 2,100 ft. 8-in. pipe, 7 cts.; 700 ft. 10-in. pipe, 9 cts.; 2,500 ft. 12-in. pipe, 12 cts.; 10 ft. 18-in. pipe, 20 cts.; 10 ft. 20-in. pipe, 20 cts.; 10 ft. 22-in. pipe, 25 cts.; 5,250 ft. 24-in. pipe, 25 cts. Sewers Below M. L. Tide—1,250 ft. 2 ft. deep, 8 cts.; 1,200 ft. 2 to 4 ft. deep, 10 cts.; 4,500 ft. 4 to 6 ft. deep, 15 cts.; 2,900 ft. 6 to 8 ft. deep, 20 cts. 6-in. Branches—2,334 ft. on 8-in pipe, 35 cts.; 88 ft. on 10-in. pipe, 50 cts.; 141 ft. on 12-in. pipe, 65 cts.; 11 ft. on 18-in. pipe, $1; 13 ft. on 20-in. pipe, $2; 22 ft. on 22-in. pipe, $2; 144 ft. on 24-in. pipe, $2.25. Manholes, Type B—194 6 ft. or less, $25; 295 6 to 12 ft., $3; 27 12 ft., $5; 13 drop manholes, $10; 29 flush tanks, each $90; 35,991 ft. restoring macadam streets, 2 cts.; 3,000 ft. timber foundation, 15 cts. Extra Concrete—10 cu. yds. Class A, $10; 100 cu. yds. Class B, $8.50; brick masonry, per cu. yd., $15; pumping station (lump sum), $4,000. Time of completion, 180 days.

Peoria, Ill.—For construction of District No. 1 sewer to Green & Son of Ottawa, Ill., for $26,917.60. There were nine bidders. Estimated cost is $29,453.90 and $1,767.23 additional for advertising, court costs, inspection, etc. Other bids as follows: Barnewolt Construction Co., Peoria, $26,986.40. Yale & Reagan, Chicago, $26,989.20. E. R. Harding & Co., Racine, Wis., $27,673.05. (This is the firm that built the east section of the North Peoria sewer.) A. C. Comstock & Co., Cedar Rapids, Ia., $27,987.40. A. D. Thompson Co., Peoria, $28,157. D. A. Myers, Peoria, $28,358.90. Public Service Construction Co., Omaha, Neb., $29,779.70. Fred Seifert & Son, Peoria, $29,779.70.

Dubuque, Ia.—For construction of sanitary sewer in Arlington St, bids were as follows: C. B. McNamara & Co., 8-in. tile pipe, per lin. ft., $2.15; manholes, each, $35; J. M. Kenety & Son, 8-in. tile pipe, per lin. ft., $1.28; manholes, each, $28. Contract was awarded to J. M. Kenety & Son, they being lowest bidders.

Lawrence, Kan.—For construction of sewer in University place to Kennedy Plumbing Company.

Schenectady, N. Y.—City has awarded contract on scheme which is altogether different than any other ever attempted in city's history. It was used in connection with award of contract to make connections between city sewer system and new intercepting sewer. This plan means that city pays for all the men employed on job and furnishes material for work, but contractor is called upon to bid percentage at which he will furnish tools, time and supervision. Bids on job submitted were as fallows: John Allen, 25 per cent; Kehoe & Bisset, 5; E. G. Davis, 13; Chas. Ippolito, 32; Kalteaux & DeNallo, 23; J. H. Gardner, 10, and T. R. Crane, 9. The contract was awarded to Kehoe & Bisset. Bids for placing sewers on Veeder Ave., Foster Ave. and Florence St. were as follows: T. R. Crane, $1,187.05; A. G. Davis, $1,146.10; Kehoe & Bisset, $1,351.50; Kalteaux & DeNallo, $1,458; John Allen, $1,393.85. A. G. Davis won contract.

Schenectady, N. Y.—Several contracts have been awarded by board of contract and supply including contracts for sewers in Florence street and section of Veeder avenue. Sanitary sewers, T. R. Crane, $1,187; A. G. Davis, $1,146.10; Kehoe and Bissett, $1,351.50; Kalteaux and DeNalio, $1,458; John Allen, $1,393.85. It was awarded to A. G. Davis. For connection of sewers at Nott and Front streets, with intercepting sewers: John Allen, Kehoe and Bissert, A. G. Davis, Charles Ippolitto, Kalteaux and DeNallo, John H. Gardner and T. R. Crane bidding, to Kehoe and Bissett for cost plus 5 per cent.

Syracuse, N. Y.—By Syracuse Intercepting Sewer Board, for Contract 23, improving Onondaga Creek, to John Young, 509 Bastable Blk., Syracuse, at $167,770.

Dayton, O.—For construction of storm sewer in St. Nicholas avenue to Schaeffer ½ Dill at $2,164.25 and storm sewer for College Park ditch to W. C. Kershner at $1,852.65.

Haskell, Okla.—For constructing sewer system, including disposal plant, to J. K. Rosch & Son, Tulsa.

Williamsport, Pa.—Joseph McCadden at his bid of 70 cents a lineal foot has been given contract to construct East Ross street house sewer.

Uvalde, Tex.—For constructing sewers to the O'Neil Engineering Co., Dallas, Tex.

Racine, Wis.—To E. R. Harding & Son, Racine, contract for 12th St. and North Side trunk sewers.

WATER SUPPLY

Stettler, Alta.—Town Council is planning to extend water system at estimated cost of $8,000 and electric light system at cost of $10,000. J. Jamieson is Engineer.

New Smyrna, Fla.—People will vote on Jan. 12, 1915, on $63,000 bond issue. Division of bond issue is for $47,000 for water, $12,000 for sewers and $4,000 for funding city's indebtedness. Plans and specifications for water and sewer systems have recently been prepared by J. B. McCrary Co., of Atlanta, and these plans and specifications were presented to City Council during last week. Water system plans call for water to be taken from two 8-in. flow wells located a mile west of city limits and conducted to a 100,000-gal. concrete reservoir near western limits of city. At this point will be located pumping station and from here water will be forced directly into distributing system and into a 75,000-gal. tank located on 75-ft. tower on city block. Tank is intended to supply city with water when the pumping station is not being operated. Plans for both the water and sewer systems call for pipes to cover main parts of city and are so drawn that both systems can be extended at any time necessity demands.

Wendell, Ida.—Citizens are considering bond issue for $10,000, proceeds of which will be used for purchase and improvement of water system.

Stronghurst, Ill.—Citizens have voted to issue bonds in sum of $12,000, proceeds of which will be used for construction of municipal water system.

Fort Scott, Kan.—Election will be held in January for voting on question of issuing bonds for $30,000, for construction of reservoir.

Attleboro, Mass.—Sum of $8,000 is recommended for repair of interior and reconstruction of exterior of standpipe and for completion of other work of water department.

Attleboro, Mass.—Sum of $8,000 has been appropriated for water department.

Haverhill, Mass.—According to decision of Water Board, there will be but one mile of water pipe laid toward Ayers Village this fall, and rest of distance will be completed next spring.

North Adams, Mass.—County Commissioners have ordered that dam of Beaman basin be raised two feet, which means that concrete core will have to be raised two feet and that dam itself will have to be raised two feet.

Pittsfield, Mass.—Installation of water meters is recommended by National Board of Fire Underwriters.

Pittsfield, Mass.—National Board of Fire Underwriters have recommended following improvements to water system: That distribution system be strengthened by early installation of mains contemplated by department and given in the table below, and of such other mains as are necessary to furnish fire supply as follows: (a) In principal mercantile district, 6,000 gals. a minute; (b) In the manufacturing districts, 3,000 to 5,000 gals. a minute; (c) In thickly built residential districts, 3,000 gals. a minute; (d) In sparsely settled residential districts, 1,500 gals. a minute.

St. Paul, Minn.—At meeting of Water Board 6-in. mains were ordered laid in Como Blvd. near Como Ave. for distance of about 300 ft. A similar pipe was ordered laid on Buford Ave. from the county road to Brompton St. Temporary 1¼-in. mains were ordered laid on the west side of St. Albans St., a distance of 184 ft. south of Marshall Ave., and on the north side of Palace St., 205 ft. west of Hamline Ave.

Manasquan, N. J.—A member of firm of Pugh and Hubbard, consulting engineers of Philadelphia, has presented plans for installation of water and sewer systems on beach front road recently acquired from Seacoast Realty Co. through dedication. Council is planning to go ahead with the work and has authorized Borough Clerk Ralph D. Bush to advertise for bids. Money must be raised by vote of people at special election which is to take place after bids have been opened. Exclusive of engineer's fees it is likely that cost of water and sewer systems will amount to figure in neighborhood of $12,000. Plan provides for installation at present time of 6-in. water main from Ocean Ave. on the north down Ocean drive as far as Ave. A, which will be first street south of the Brielle Rd. when property is developed. Ten-inch sewer main will be laid as far as Brielle Rd., 6-in. to Ave. B and last stretch down to river will be 4-in. The 6-in. water main will run off of 4-in. main for the present, but Council was unanimous in belief that it was only a question of short time before a 6-in. main would be necessary in East Main St. and would conect with Ocean drive main which is in contemplation. For adequate handling of sewerage it will be necessary to build another septic tank larger than one in use at present time. This tank will be of sufficient capacity to treat any sewerage that may in future be produced from territory to be opened up and also take care of that which is not being properly treated in present purification tank. Bids for work are to be opened on the night of Nov. 17.

Albany, N. Y.—Bids will be received at office of Comptroller, in City Hall, Albany, N. Y., until 11 a. m., November 12, 1914, for whole or any denominational part of $200,000 Registered Bonds of City of Albany, N. Y., as follows: $200,000 4½ per cent. extension of water system bonds. Tobin M. Foll is comptroller.

Binghamton, N. Y.—Changes in water system are being considered.

Brooklyn, N. Y.—The development of city's source of water supply on Long Island will not be undertaken by city until completion of Catskill water shed, if recommendations to Board of Estimate by Board of Water Supply are approved.

Springfield, O.—That city may profit by what is considered an exceptionally low market, City Manager Ashburner has authorized taking of bids on next year's supplies for water-works department, same to be furnished in any quantity as city may require. Bids must be in by noon, Nov. 13. Superintendent Cotter has planned extensive improvements in his department for next year, and supplies to be bid on include 300 tons of 6-in. cast-iron pipe, 1,000 curb boxes, 1,000 ferrules, 100 roadway boxes, 55 valves, 30 fire hydrants and 20 tons of lead.

Steubenville, O.—Filtration bonds in sum of $65,000 have been sold to Spitzer, Rorick & Co., of Toledo.

Guthrie, Okla.—Town of Billings is making many improvements and will put in system of waterworks and electric light plant at once.

Morris, Okla.—Bids will be received by Board of Trustees up to 6 p. m., Nov. 16, 1914, for construction of water-works system. The Benham Engineering Co., Oklahoma City, are Consulting Engineers.

Portland, Ore.—Commissioner Daly has asked for $100,000 for building dam at Bull Run headworks and $100,000 for important main extensions.

Allentown, Pa.—Ordinance has been passed for laying of 6 in. water main in South Brook street.

Altoona, Pa.—Permit has been issued for construction of distributing reservoir and pipe lines.

Dayton, Pa.—Permit has been issued for supplying water from drilled wells and distributing system.

Middleburg, Pa.—Permit has been granted for intake dams and gravity supply line.

Portage, Pa.—Permit has been granted for new source of water supply and gravity main.

Punxsutawney, Pa.—Four maps are now in preparation and as soon as these are completed petition to establish municipal water system in this city will be presented to Public Service Commission. It is necessary to submit plan of system to Public Service Commission, the State Health Department and Water Supply Commission. Borough engineer is now engaged in preparing these maps.

Stroudsburg, Pa.—New source of water supply and gravity main has been approved of.